

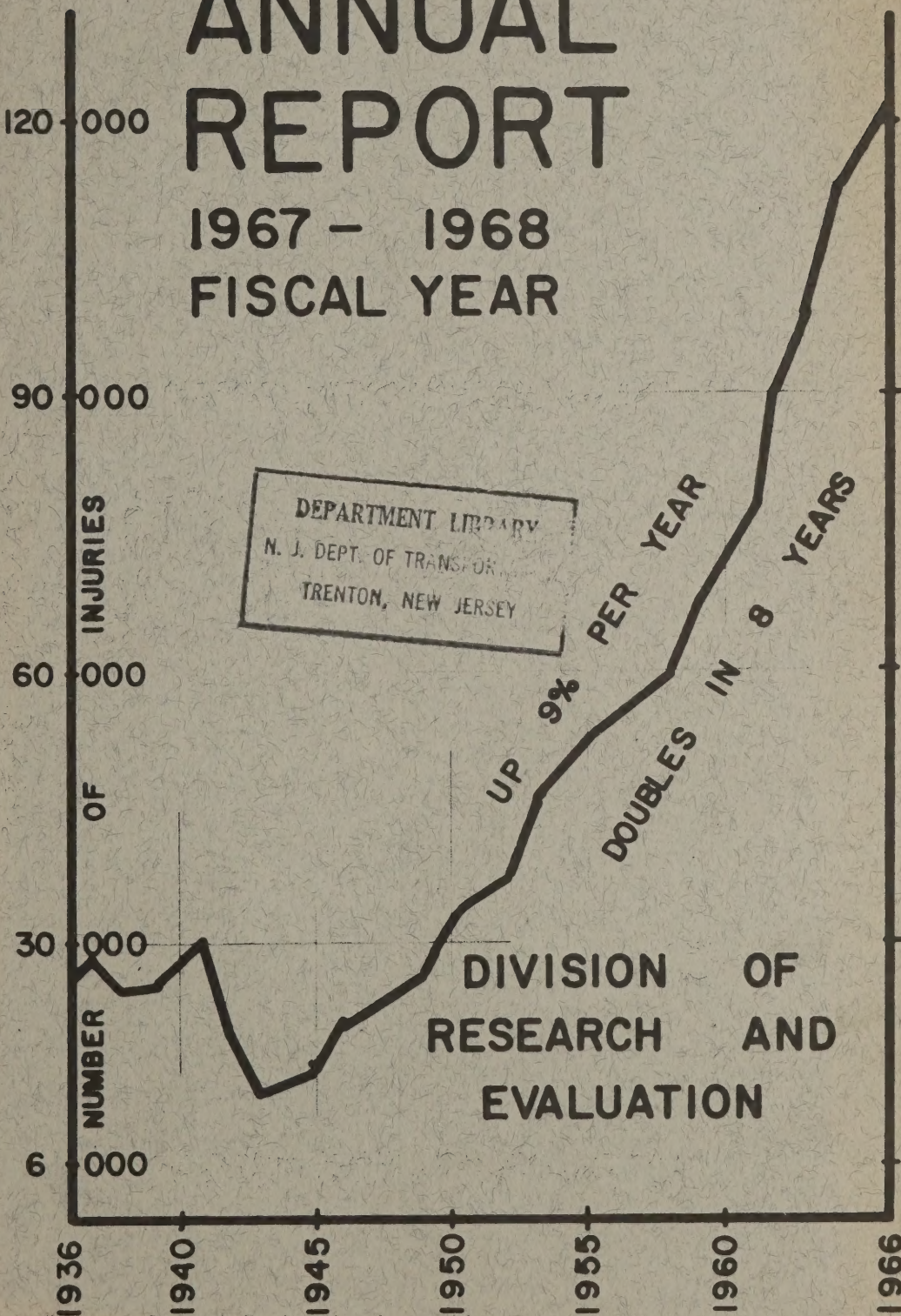
INSTEAD OF WAITING FOR IT; IT IS THE TOMORROW-MIND

SCIENTIFIC RESEARCH — RESEARCH IS A STATE OF MIND WELCOMING CHANGE: TO LOOK FOR CHANGE

INSTEAD OF THE YESTERDAY-MIND — IF YOU WANT TO KNOW, YOU HAVE TO SEARCH — LEARN

ANNUAL REPORT

1967 — 1968
FISCAL YEAR



RESEARCH IS NOT IN ITSELF A SCIENCE, IT IS STILL AN ART OR

NEW JERSEY DEPARTMENT OF TRANSPORTATION

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**N. J. D. T.
RESEARCH
STUDY
AHEAD**

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AT DORE'S HEADQUARTERS: THE LARGEST ROAD MAP OF NEW JERSEY EVER ASSEMBLED ON ONE WALL.

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Front Cover: Evolution of Traffic Accident Injuries in New Jersey

OF ROADS AND MEN

OUR LIFE, THEN, IS ON THE ROAD,
AS IS SO WELL EXPRESSED IN THE MOTTO
OF THE INTERNATIONAL ASSOCIATION OF
ROAD CONGRESSES:

"ALL LIVING ANIMALS ARE EQUIPPED
WITH MEANS TO MOVE FROM ONE PLACE TO
ANOTHER, INCLUDING MAN, WHOSE LEGS
SERVE HIM WELL FOR DISTANCES UP TO 20
MILES A DAY. TO TRAVEL FARTHER AND
FASTER, AND TO CARRY LOADS WITH LESS
FATIGUE, MAN TRAVELS VIA BRAIN RATHER
THAN LEGS, AND HE HAS DEVISED WAYS OF
RIDING ON OTHER ANIMALS SUCH AS HORSE
OR OXEN OR HAVING THEM PULL HIS
VEHICLES. WE HAVE MORE OR LESS DONE
AWAY WITH LEGS AS A BASIC MEANS OF
TRANSPORTATION BY DEVISING COMPLICATED
POWER PLANTS TO TURN THE WHEELS OF
OUR VEHICLES."*

WE WANT THOSE VEHICLES, BUT THEY
TOOK HOLD OF US, SO MUCH THAT "WE
LIVE IN A ROAD-CIVILISATION," WHERE
"BUILDING ROADS MAY BE A GREATER DEED
THAN THOSE OF GENERALS WITH GILDED
SHOULDERS." EMERSON ALREADY SAID,
LONG AGO, THAT "HE WHO BUILDS A GREAT
ROAD EARNS A PLACE IN THE STORY."

* From an exhibit of ancient vehicles
in the Americana section of the New
Jersey State Museum in Trenton.



THE ROAD IS, INDEED, THE LIFE - BUT
OFTEN IT IS A PLACE OF DEATH. WE HAVE
GAINED MOBILITY, WE HAVE ALSO GAINED
DANGER. THIS IS WHERE ENGINEERING AND
RESEARCH COME IN: AS DOCTORS OF ROADS,
THE CONSTRUCTION AND TRAFFIC ENGINEERS
BECOME DOCTORS OF HUMAN SAFETY.

AND THE DANGER GROWS: A LONG-TERM
ANALYSIS SHOWS THAT AS TIME GOES BY,
THE RATE OF GROWTH OF TRAFFIC CONTIN-
UES TO OUTRUN THE ONE OF POPULATION,
AND IN TURN THE PROLIFERATION OF IN-
JURIES RUNS AHEAD AT A STILL FASTER
CADENCE. OUR COVER GRAPH DRAMATICALLY
ILLUSTRATES THIS TREND.

AT THE BASIS OF THE PHENOMENON THERE IS UNDOUBTEDLY MORE THAN A MERE GROWTH OF THE NUMBER OF PEOPLE, THERE IS A DEEP MUTATION IN THEIR WAY OF LIFE. TO THE UNIVERSAL MULTIPLICATION AND GROWTH AND SPEED-UP OF EVERYTHING HAVE BEEN ADDED THE STRIKING SHIFTS FROM OTHER MODES OF TRANSPORTATION TO THE PASSENGER VEHICLE, AND THE ACCELERATED TREND TOWARD URBANIZATION. THE EFFECTS OF THIS BASIC EVOLUTION HAVE BEEN INTENSIFIED BY THE IMPACT OF THE INTERSTATE PROGRAM OF CONSTRUCTION. THE SHEER SIZE OF THE PROBLEM IS THUS MADE MORE SERIOUS BY ITS UNDERLYING COMPLEXITY, POINTING TO OUR MISSION AS ONE OF THE MOST SERIOUS ONES OF OUR REVOLUTIONARY TIMES.

IN SPITE OF THE CONSIDERABLE GROWTH OF EXPENDITURE INVESTED INTO ROAD CONSTRUCTION AND IMPROVEMENTS IN RECENT YEARS, THE GAP BETWEEN THE NEED AND THE SOLUTION IS GROWING EVERY YEAR, IN A RACE AGAINST TIME. THIS CRITICAL SITUATION CALLS FOR INCREASED AND ACCELERATED EFFORTS SUSTAINED BY UP-TO-DATE MEANS, APPLIED WITH CREATIVE, SOMETIMES BOLD, IMAGINATION. THE MULTIPLICATION OF CUSTOMARY MEANS CANNOT, ALL BY ITSELF, ALLEVIATE THE PROBLEM; NEW MEANS HAVE TO BE BROUGHT TO BEAR.

UNPRECEDENTED PROBLEMS CALL FOR NEW AND SPECIALIZED MEANS. A WIDER AND DEEPER KNOWLEDGE HAS BECOME INDISPENSABLE IN EVERY FIELD OF HIGHWAY TRANSPORTATION, A KNOWLEDGE WHICH IS THE MISSION OF RESEARCH.

* * * * *

THIS CONCLUSION PARALLELS THOSE OF MANY OTHER INDUSTRIES AND INSTITUTIONS

FACED WITH THE NOVEL AND OVERSIZED PROBLEMS OF THE HISTORIC PERIOD IN WHICH WE ARE LIVING, AS THE FOLLOWING FIGURES SHOW:

IN THE COUNTRY AS A WHOLE, THE EXPENDITURES FOR RESEARCH AND DEVELOPMENT HAVE GROWN BY OVER 13% PER YEAR BETWEEN 1920 AND 1965 IN COMPARISON WITH ONLY 5-1/2% FOR THE GROSS NATIONAL PRODUCT. IN A MORE DIRECT RELATION, R & D, WHICH WAS ONLY 0.18% OF GNP IN 1930, HAD REACHED 2.82% BY 1962. IN 1965, THE NATIONAL TOTAL R & D OUTLAY EXCEEDED \$20 BILLION. IT HAS BEEN ESTIMATED THAT ABOUT ONE MILLION WORKERS WERE EMPLOYED IN, OR IN SUPPORT OF R & D IN 1960. THERE IS EVERY REASON TO BELIEVE THAT THE MOMENTUM OF THIS TREND HAS AMPLIFIED STILL MORE IN THE LAST FEW YEARS.

MANY OF THESE DEVELOPMENTS STARTED IN TIMID WAYS AND PRIMITIVE SURROUNDINGS. EARLY LABORATORIES BEGAN IN INEXPENSIVE BARN-LIKE SPACES WITH SIMPLIFIED EQUIPMENT AND SERVICES. WITH ONLY FEW EXCEPTIONS, BUILDINGS SPECIALLY DESIGNED FOR RESEARCH PURPOSES DID NOT APPEAR UNTIL THE 1920'S. ONLY AT THAT TIME AND IN THE EARLY 30'S, THE LARGER COMPANIES FOUND THAT THEIR SMALL LABORATORIES DID NOT MEET THEIR NEEDS; SMALL, MAKE-SHIFT INSTALLATIONS BEGAN TO GROW INTO SPECIALIZED DEPARTMENTS.

THE LAST 25 YEARS HAVE WITNESSED A CONSIDERABLE INCREASE IN THE NUMBER OF SUCH LABORATORIES. THESE HAD STARTED AS STEP-CHILDREN BUT, ONE BY ONE, THEIR DEGREE OF AUTONOMY INCREASED AND THE NUMBER OF SPECIALLY DESIGNED AND SPECIALLY ORGANIZED CENTERS MULTIPLIED TO SUCH AN EXTENT THAT THEY HAVE BECOME THE NORMAL SOLUTION FOR EVERY UP-TO-DATE ORGANIZATION.

IN RECENT YEARS THESE CENTERS HAVE BEEN EQUIPPED, NOT ONLY WITH ADVANCED AND REFINED INSTRUMENTS, BUT ALSO WITH BUILDINGS CREATING ATMOSPHERES PROPITIOUS TO THE MOST CREATIVE KIND OF WORK. SOME OF THEM ARE MAGNIFICENT ENOUGH TO FUNCTION ON THE SIDE AS PUBLIC RELATIONS SHOWPLACES.

ALL MODERN ORGANIZATIONS HAVE REALIZED THAT IN THE WHIRLWIND OF CHANGE OF OUR TIME, THERE IS NO REAL ALTERNATIVE TO RESEARCH. IN OUR OWN FIELD OF TRANSPORTATION, NOTHING CAN EQUAL IN EFFECTIVENESS THE INVESTIGATIONS MADE BY THE PROFESSIONAL HIGHWAY MEN THEMSELVES, PROVIDED THAT THEY ARE PROPERLY EQUIPPED AND STAFFED; ON THE CONDITION ALSO THAT THEIRS BE "A STATE OF MIND WELCOMING CHANGE, THE TOMORROW-MIND INSTEAD OF THE YESTERDAY-MIND", AS KETTERING REMARKED.

LITTLE EXAMPLES FROM OUR OWN HISTORY WILL DEMONSTRATE THE SIGNIFICANCE OF THE MENTAL SWITCH FROM THE PAST TO THE FUTURE. BACK IN 1927, ROADS WERE BEING BUILT WITHOUT THE AID OF CONSTRUCTION PLANS AND SPECIFICATIONS; WHEN A LITTLE LATER SOME INDIVIDUALS WERE GIVEN THE RESPONSIBILITY OF PREPARING PLANS AND SPECIFICATIONS, THE OLDER SCHOOL OF THOUGHT QUESTIONED THE JUSTIFICATION OF SUCH CHANGES. SOME 10 YEARS AGO, OUR ATTITUDE TOWARD THE IDEA OF RUMBLE STRIPS WAS NEGATIVE, BASED ON APPARENTLY RATIONAL GROUNDS; SINCE THAT TIME THE EXPERIENCE OF OTHER STATES HAS SPOKEN SO CLEARLY THAT WE MADE ONE INSTALLATION OURSELVES---AND IT WORKS.

IN HIS EXCELLENT BOOK ON RESEARCH, BICHOWSKY TELLS HOW THE CONSERVATIVES OF

A CENTURY AGO REACTED TO THE NOVEL TRENDS IN TRANSPORTATION. IN 1850 ALL REASONABLE PEOPLE WERE CERTAIN THAT THOSE NEWFANGLED GADGETS CALLED RAILROADS WOULD NEVER BE ABLE TO CHALLENGE THE OBVIOUS EFFECTIVENESS OF THE THEN ALL-POWERFUL CANALS. YET, 20 YEARS LATER, THE CANAL-SOLUTION WAS PRACTICALLY OBSOLETE, AND THE RAIL HAD BECOME KING.

BUT THE TIME WOULD ALSO COME WHEN HIS REIGN WOULD BE ENDANGERED. IN 1910 HE FELT BIG AND SECURE, YET BY 1940 THE "INROADS"---THIS WORD ITSELF CARRIES THE MEANING---THE INROADS OF THE AUTOMOBILE HAD STARTED THE RAILROAD'S RELATIVE DECLINE. THE POPULAR "CAR" NOW APPEARS ON TOP, BUT AT THIS TIME OF WRITING THE TRANSPORTATION OF THE FAR FUTURE, WITH THE AIRPLANE SPREADING ITS WINGS, LOOKS WIDE OPEN. BUT OUR IMMEDIATE TASK IS TO MOVE MORE MEN ON THE ROADS IN SAFETY. HOW? "IF YOU WANT TO KNOW", SAID PASCAL, "YOU HAVE TO SEARCH". AND ABELARD: BY DOUBTING WE ARE LED TO INQUIRE, AND BY INQUIRING WE PERCEIVE THE TRUTH... W.R.B.: EACH FAILURE LEADS US CLOSER TO SUCCESS.

* * * * *

SOMEONE SAID OF THE AMERICANS: "THESE NEW ROMANS REMAKE THE FACE OF THE EARTH."

AH, SWEET MYSTERIES OF LIFE;

EACH SOLUTION ADDS TO YOUR SPLENDOR

(W.R.B.)

HIGHLIGHTS

JUST AS THIS DEPARTMENT'S CLOVER LEAF, ITS JUGHANDLE, ITS CENTER BARRIER, ROSE BY DEGREES TO NATIONWIDE RECOGNITION, OUR WORK IN OTHER FIELDS HOLDS PROMISES OF FUTURE SUCCESSES, FIRST OF ALL IN THE SOLUTION OF OUR LOCAL PROBLEMS.

OUR STUDY OF BRIDGE JOINT SEALERS IS SUCH A STEPPING STONE; IT ALREADY LED TO LEADERSHIP IN A NATIONAL TECHNICAL COMMITTEE.....THE GRADUAL ADVANCE OF OUR FOG ABATEMENT EXPERIMENTS IS BEING WATCHED FROM AS FAR AS THE COUNTRY OF THE PROVERBIAL LONDON PEASOUP.....OUR EQUALLY VISIONARY EFFORTS WITH HOLOSIGNS ARE GETTING CLOSER TO THE ROOTS OF ONE OF THE MOST TANGIBLE HAZARDS ON OUR ROADS.

THE NEW HIGHWAY CONCEPT IS IN FACT AN IDEALIZED GUIDE FOR PLANNING A ROADWAY NETWORK, BASED ON A MAXIMATION OF THE FREEWAY PRINCIPLE.....ACCIDENTS ARE, OF COURSE, OUR MAJOR CONCERN: IN THE COURSE OF THIS FISCAL YEAR WE FOUND THAT IT IS POSSIBLE TO ISOLATE AND MEASURE THE DEGREE OF INTERNAL FRICTION ACCIDENTS, THUS MAKING THE REAL CAUSE OF

ACCIDENTS MORE APPARENT AND REDUCEABLETHE MILEPOST SYSTEM HAS BEEN FOLLOWED BY AN ANALYSIS OF ACCIDENT PATTERNS THAT BRING OUT ITS FULL SIGNIFICANCE..... OUR SERIES OF CONSTRUCTION COST INDEXES LAID THE FOUNDATIONS FOR A PRACTICAL TOOL FOR ECONOMICAL PLANNING.....ANOTHER TOOL IS THE SERIES OF ABRIDGMENTS AND RATINGS OF THE NUMEROUS HRB AND NCHRP REPORTS, DESIGNED TO MAKE THEIR EFFECTIVE USE LESS TIME CONSUMING.

NOT TO FORGET THIS DIVISION'S OWN FUTURE, THE CONCEPTION AND PRESENTATION OF THE UNAVOIDABLE PROJECT TO BUILD AN ADEQUATE RESEARCH AND TESTING CENTER AIMS AT LIFTING US UP TO THE LEVEL OF CAPACITY REQUIRED BY OUR MISSION IN OUR TIME.

ALREADY, THE DIVISION'S SCIENTIFIC EQUIPMENT IS GRADUALLY BUILDING UP, AS FINANCIAL MEANS BECOME AVAILABLE.

IN THE COURSE OF THIS FISCAL YEAR, SEVERAL MAJOR UNITS WERE DELIVERED AND PUT TO USE BY THE BUREAU OF STRUCTURES & MATERIALS. THE APPENDED PICTURES SHOW THE ROUGHOMETER AND THE SKID RESISTANCE TRAILER IN OPERATION IN THE FIELD, AS WELL AS THE OZONE CHAMBER INSTALLED AT FERNWOOD FOR THE TESTING OF ELASTOMERIC BRIDGE JOINT SEALERS.

THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS RECEIVED A LASER SYSTEM TO BE USED IN THE STUDY OF HOLOGRAPHY, FOR WHICH A HOLOGRAPHIC CAMERA AND A PHYSICAL OPTICS KIT ARE ON ORDER. FOR THE MOBILE TELEVISION SURVEILLANCE PROJECT, TWO MORE VIDEO TAPE RECORDERS, SPECIAL LENSES AND MICROPHONES HAVE BEEN COMMISSIONED.

AS A FURTHER EXPANSION OF THE FOG ABATEMENT EXPERIMENTS, 20 FOG BROOMS ARE ON ORDER, TOGETHER WITH AN EDISON FOG RESPONDER AND A MULTIWRITER RECORDER, ALL DESTINED TO THE NEW INSTALLATION ON ROUTE 1, IN THE VICINITY OF THE NEWARK AIRPORT.

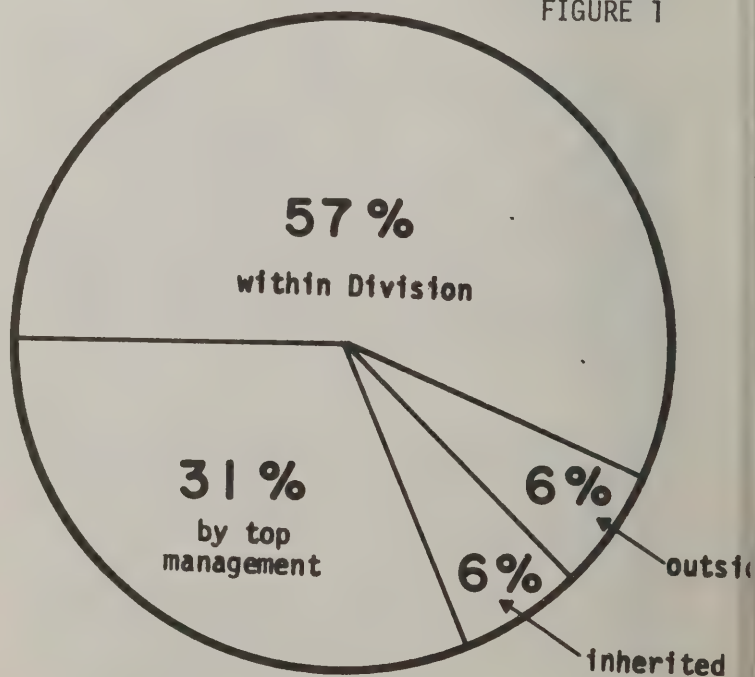
TWO POLAROID AND ONE NIKKOR CAMERAS, AS WELL AS A BOLES MOVIE CAMERA, ALL WITH APPROPRIATE ACCESSORIES, ARE EXPECTED SHORTLY, FOR GENERAL USE IN THE WORK OF THE DIVISION.

THE SLIDE-RULE, THE CALCULATOR, THE DRAFTING BOARD, REMAIN OF COURSE THE MOST FAMILIAR TOOLS OF OUR RESEARCHERS. BUT MUCH OF THE ACTIVITY OF THE DIVISION'S PERSONNEL TAKES PLACE IN THE FIELD---MEASURING, COLLECTING DATA, INSPECTING, TESTING---FOR ESTABLISHING FACTS, OR EVALUATING THEIR IMPLICATIONS. THE TECHNICIANS OF THE BUREAU OF STRUCTURES AND MATERIALS SPEND MOST OF THEIR TIME OUTDOORS; THE PROGRAM OF THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS IS FREQUENTLY CENTERED ON THE LABORATORY; ALL TOLD, THE ENGINEERS OF ALL THREE BUREAUS DIVIDE THEIR WORK BETWEEN OFFICE AND THE OPEN, IN PROPORTIONS THAT VARY GREATLY WITH THE NATURE OF EACH PROJECT.

GEOGRAPHICALLY, THE FIELD ACTIVITY OF THE DIVISION IS SCATTERED ALL OVER NEW JERSEY TO SUCH AN EXTENT THAT WE CALL THE STATE "OUR BIG OUTDOOR LAB": SEE THE MAP THAT FOLLOWS.

THE END-CHAPTERS OF THIS ANNUAL REVIEW WILL GIVE COMPLETE DETAILS ON THE WORK PROGRAMS OF THE THREE BUREAUS, THEIR ACHIEVEMENTS AND FURTHER PLANS. MOST (57%) OF THE ACTIVE PROJECTS LISTED FOR FISCAL 1968 ORIGINATED WITHIN THE DIVISION ITSELF, AS ILLUSTRATED IN THE CHART BELOW. 31% OF THE NUMBER OF PROJECTS WERE UNDERTAKEN AT THE REQUEST OF THE DEPARTMENT'S TOP MANAGEMENT; ANOTHER 6% WERE PROMPTED OUTSIDE THE DEPARTMENT; THE REMAINING 6% WERE INHERITED FROM OUR PREDECESSORS.

FIGURE 1



CONTINUED

THE CONTINUED GROWTH OF OUR PRODUCTION OF REPORTS IS APPARENT ON THE GRAPH AND THE DETAILED TABLE THAT FOLLOW.

THE DIVISION'S OUTSIDE ACTIVITIES ARE ILLUSTRATED BY THE TABLE OF MEETINGS AND THE ONE OF COMMITTEES TO WHICH MEMBERS OF OUR STAFF BELONG.

WHILE THE DIVISION'S MEMBERSHIPS IN COMMITTEES REMAINED FAIRLY STABLE, THE NUMBER OF MEETINGS (OF THESE COMMITTEES AND OTHER CONFERENCES) IN WHICH THEY PARTICIPATED SHOWED A CONSIDERABLE INCREASE.

SEVERAL PUBLIC TALKS -- MOSTLY OF AN EDUCATIONAL NATURE -- WERE GIVEN BY MEMBERS OF THE DIVISION DURING THE FISCAL YEAR UNDER REVIEW:

W.R. BELLIS SPOKE LAST NOVEMBER AT RIDER COLLEGE IN TRENTON AND THE LIONS CLUB OF LINDEN, AS WELL AS IN APRIL AT THE NAVAL RESERVE RESEARCH COMPANY IN PRINCETON;

D.W. GWYNN CONTINUED HIS LECTURES TO THE CIVIL ENGINEERING DEPARTMENT OF RUTGERS UNIVERSITY FROM JANUARY TO MAY, AND IN APRIL ADDRESSED THE CIVIL ENGINEERING CLASS OF WEST VIRGINIA UNIVERSITY.



THE BIG OUTDOOR LAB

DORE OFFICES:

Rahway

Mercer Airport

Fernwood

Headquarters



1967
OPERATING STATE HIGHWAYS

STATE OF
NEW JERSEY

PREPARED BY THE
NEW JERSEY DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
BUREAU OF PUBLIC ROADS

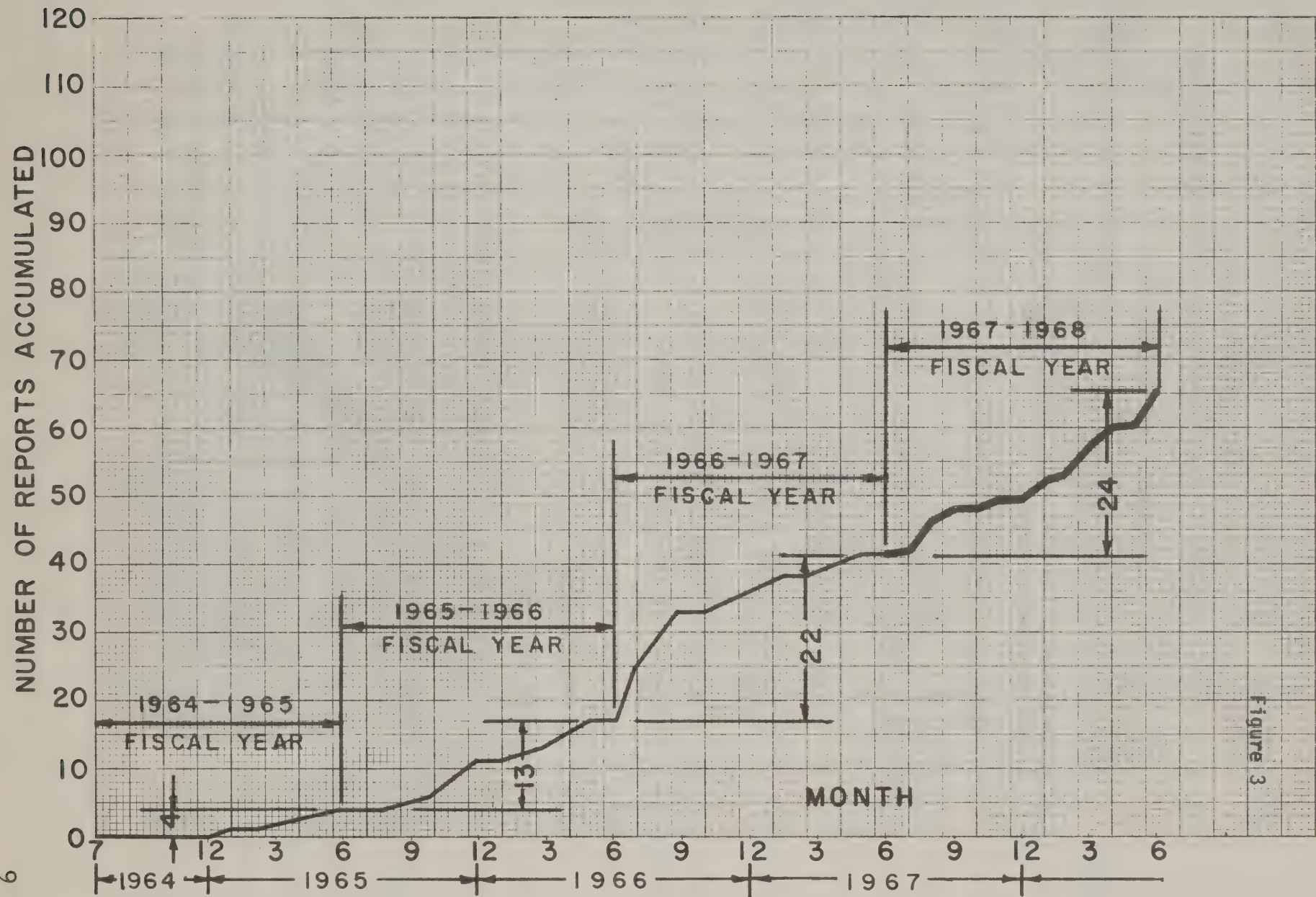


Figure 3

TABLE I

FISCAL YEAR 1967-1968

REPORTS PREPARED BY THE DIVISION OF RESEARCH AND EVALUATION

REPORT NUMBERS	TITLE	BUREAUS		
		S.M.	S.T.	E.S.A.
68-001-7702	Experimental Pavement Project, Routes 80 & 95, Third Interim Report	X		
68-002-7706	Intersection Design - Fall 1967		X	
68-003-7760	Dolomite Study	X		
68-004-7754	Rumble Strips	X		
68-005-7702	Experimental Pavement Project, Routes 80 & 95, Fourth Interim Report	X		
68-006-7705	Capacity of Design Features, Detour Route Around Route 21		X	
68-007-7767	Fog Abatement Progress Report			X
68-008-7785	Evaluation of Metallic Bridge Decks	X		
68-009-7704	Truck Equivalency		X	
68-010-7771	Colored Pavement		X	
68-011-7789	Yield Sign Study		X	
68-012-7716	Two Wire Emergency Call System, Interim Report No. 2			X
68-013-7784	Portland Cement Concrete Pavement Damage Due to Joint Intrusion and Thermal Expansion	X		
68-014-7734	Fourth Interim Report, Route 3	X		
68-015-7772	Skid Resistance-Supplementary Guidelines	X		
68-016-7707	Traffic Flow Simulation Through Successive Traffic Signals		X	
68-017-7788	Chain Link Fence Evaluation	X		

continued

TABLE I

FISCAL YEAR 1967-1968

REPORTS PREPARED BY THE DIVISION OF RESEARCH AND EVALUATION

REPORT NUMBERS	TITLE	BUREAUS		
		S.M.	S.T.	E.S.A.
68-018-7781 (7711)	Statistical Correlation & Variance Analysis; Part I: Structural Concrete	X		
68-019-7769	Milepost Inventory		X	
68-020-7703	Relationship of Accident Rates with Hourly Traffic Volumes		X	
68-021-7734	Experimental Composite Pavement, Route 3 (Paper)	X		
68-022-7702	Experimental Pavement Project Routes 80 & 95 (Presentation)	X		
68-023-7781	Statistical Study of Asphaltic Concrete (Presentation)	X		
68-024-7704	Truck Equivalency on a Multilane Roadway		X	



NUMBER OF MEMBERS IN COMMITTEES

TABLE II

	S.M.	S.T.	E.S.	D.
12 <u>HIGHWAY RESEARCH BOARD:</u>				
HIGHWAY CAPACITY				1
ADHESIVES, BONDING AGENTS AND THEIR USES			1	
CHARACTERISTICS OF TRAFFIC FLOW		1		
ELECTRONIC RESEARCH IN THE HIGHWAY FIELD			1	
HIGHWAY SAFETY		1		
MAINTENANCE OF BITUMINOUS PAVEMENTS	1			
OPERATIONAL EFFECTS OF GEOMETRICS		1		1
QUALITY OF TRAFFIC SERVICE		2		
SURFACE PROPERTIES-VEHICLE INTERACTION	1			
VEHICLE CHARACTERISTICS		1		
NUCLEAR PRINCIPLES AND APPLICATIONS			1	
FUTURE CONCEPTS				1
	2	6	3	3
5 <u>INSTITUTE OF TRAFFIC ENGINEERS:</u>				
DELINEATION OF EXIT AND ENTRANCE RAMPS		2		
PHILOSOPHY OF SIGNS		2		
SIGNIFICANCE OF COLORED PAVEMENTS		1		
YIELD SIGNS		1		
SIGNALIZED INTERSECTION CAPACITY PARAMETERS		1		
		7		
2 <u>INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS:</u>				
AUDIO AND ELECTRICAL ACOUSTICS			1	
VEHICULAR COMMUNICATIONS			1	
			2	
2 <u>NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM:</u>				
TWO ADVISORY COMMITTEES: 1967-1968 REGISTER			1	1
1969-1970 REGISTER			1	1
			2	2
1 <u>AMERICAN SOCIETY FOR TESTING AND MATERIALS:</u>				
ROAD AND PAVING MATERIALS (2 TASK GROUPS)	1			
	1			
22 COMMITTEES	3	13	7	5
28 MEMBERS				

PROFESSIONAL MEETINGS

		S.M.	S.T.	E.S.	D.
<u>1967</u>					
JULY	ENVIRONM. SCIENCE CONFER., SEATTLE, WASH.			1	
AUG.	INTER. CONFER. ASPHALT DESIGN, ANN ARBOR, MICH. NAT. CONFER. SERVICE & SAFETY, DENVER, COL.	1	1		
SEPT.	ITE, ANNUAL, ST. LOUIS, MO. N.J. ASPH. PAV. ASSOC., DISTRICT, W. ORANGE, N.J.	1	3		1
OCT.	NCHRP, ADVIS. COMM., WASHINGTON, D.C. ITE, N.Y. METROP. SECT., NEW YORK, N.Y. VA. HWY. RES. COUNCIL, CHARLOTTESVILLE, VA. AMER. AUTOM. MEDIC. ASS., ANNUAL, PHILA., PA.		2 1 1	1	
NOV.	ASTM & SKID CORRELATION CONFER., OCALA, FLA. ASTM, TASK GROUP J, TRENTON, N.J. ITE, N.Y. METROP. SECT., NEW YORK, N.Y.	1 1	2		
DEC.	ITE, N.Y. METROP. SECT., NEW YORK, N.Y.		3		
<u>1968</u>					
JAN.	HRB, ANNUAL, WASHINGTON, D.C. ASTM, WINTER, ATLANTIC CITY, N.J. ITE, N.Y. METROP. SECT., NEW YORK, N.Y.	1 1	5 2	1	1
FEB.	NCHRP, ADVIS. COMM., WASHINGTON, D.C. ITE, N.Y. METROP. SECT., NEW YORK, N.Y.		3	1	
MAR.	NCHRP, ADVIS. COMM., WASHINGTON, D.C. IEEE, CONVENTION, NEW YORK, N.Y. N.J. ASPH. PAV. CONFER., NEW BRUNSWICK, N.J. N.J. ASPH. PAV. ASSOC., ANNUAL, CHERRY HILL, N.J. ITE, N.Y. METROP. SECT., NEW YORK, N.Y.	5 3	1	1	1
APR.	AICE, DIVISIONAL, PHILADELPHIA, PA. ASTM, TASK GROUP J, TRENTON, N.J. ITE, N.Y. METROP. SECT., NEW YORK, N.Y. W.VA. UNIV. TRAFF. ENGIN. SEMIN., MORGANTOWN, W.VA.	1 1	2 1	1	
MAY	ORSA, NATIONAL, SAN FRANCISCO, CAL. NCHRP, ADVIS. COMM., WASHINGTON, D.C. ASCE, ANNUAL, CHATTANOOGA, TENN. ITE, METROP. SECT., NEW YORK, N.Y. N.J. HIGHWAY USERS CONFER., TRENTON, N.J. ITE/HRB, VISIBILITY SEMINAR, COLLEGE STATION, TEXAS		1 2 2 1	1 1	1
JUNE	ASTM, ANNUAL, SAN FRANCISCO, CAL.	1			
34 MEETINGS		17	33	8	4
TOTAL ATTENDANCE		62			

GENIUS MAY PRODUCE A GREAT IDEA, SAID W.H. GEORGE,
BUT NO AMOUNT OF GENIUS
WILL ALONE PRODUCE A FACT.

YES, REMARKED HENRI POINCARÉ,

SCIENCE IS BUILT UP OF FACTS

AS A HOUSE IS BUILT UP OF STONES;
BUT AN ACCUMULATION OF FACTS IS NO MORE A SCIENCE
THAN A HEAP OF STONES IS A HOUSE

PERSONNEL

THE PERSONNEL MANNING LEVEL OF THE DIVISION FLUCTUATED DURING THE FISCAL YEAR FROM 50 TO 58 FULL-TIME EMPLOYEES, AUGMENTED BY ASSISTANCE FROM COOPERATIVE-STUDENT TRAINING PROGRAMS, STUDENT ASSISTANTS (SEASONAL SUMMER COLLEGE STUDENTS) AND OTHER TRAINEE PROGRAMS. DETAILS APPEAR IN FIGURES 5,6,7 AND 8 HEREAFTER. THE PERSONAL BIOGRAPHIES OF THE PROFESSIONAL EMPLOYEES CAN BE FOUND IN APPENDIX I.

RECRUITMENT CONTINUES TO BE A SERIOUS PROBLEM, COMPOUNDED BY THE HIGHER MONETARY OFFERS OF INDUSTRY AND THE USUAL COMPLEX CONTROLS OF GOVERNMENT. THE ORGANIZATION CHART ON PAGE 16 ILLUSTRATES THE LAG.

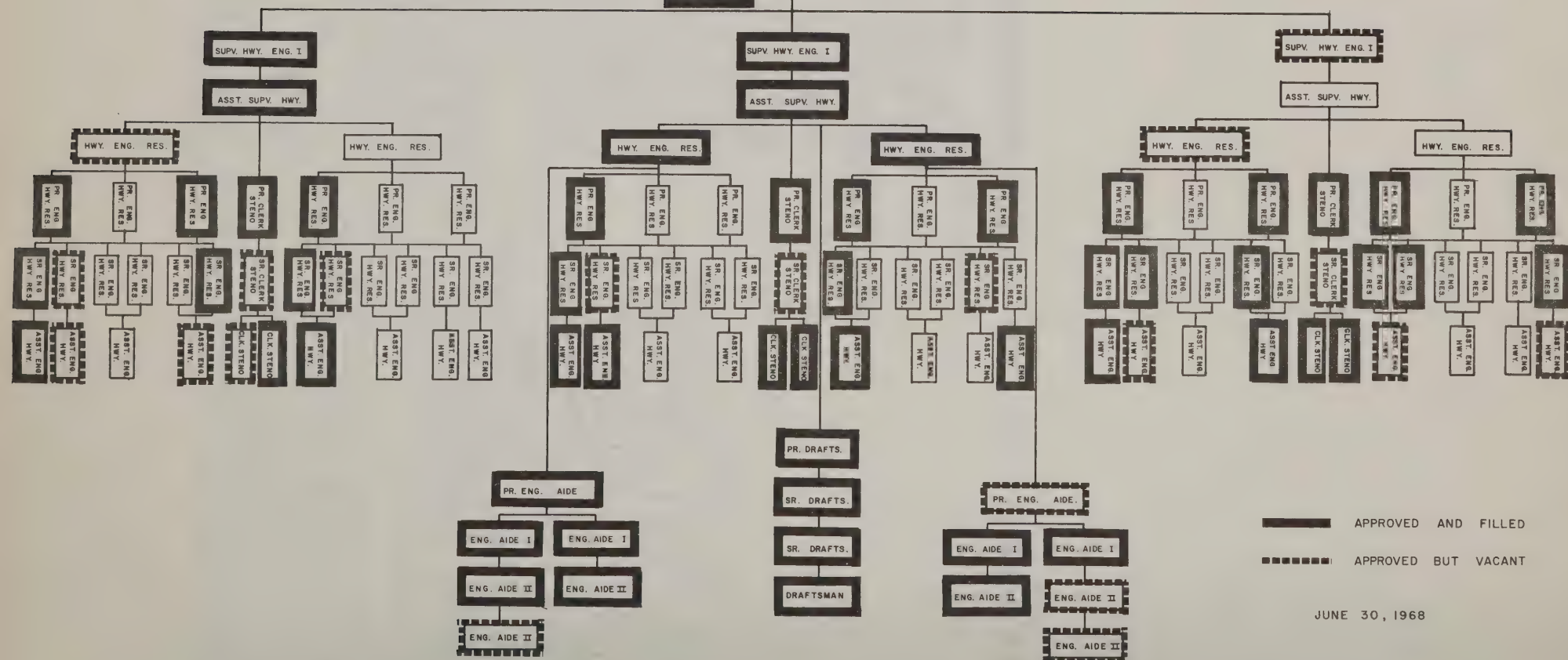
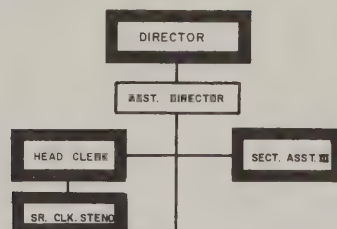
PERSONNEL TRAINING

DURING THE FISCAL YEAR, SEVEN TRAINEES WERE ASSIGNED TO THE DIVISION AS PART OF A STATE AND DEPARTMENT PROGRAM TO PREPARE HIGH SCHOOL DROPOUTS AND UNEMPLOYED FROM DEPRESSED AREAS TO BECOME ADEQUATELY QUALIFIED FOR ENTRANCE LEVEL POSITIONS. ONE CLERICAL TRAINEE AND SIX ENGINEERING-AIDE TRAINEES WERE ASSIGNED. OF THE LATTER, 4 ULTIMATELY QUALIFIED FOR A HIGH SCHOOL EQUIVALENCY CERTIFICATE AND SUBSEQUENTLY ATTAINED PERMANENT STATUS AS ENGINEERING AIDE, TRAINEE; THEY WILL SUBSEQUENTLY BE EXAMINED FOR THE ENTRANCE LEVEL OF ENGINEERING AIDE II OR DRAFTSMAN.

FIVE STUDENTS WERE TRAINED IN THE DIVISION UNDER A COOPERATIVE PROGRAM WITH LOCAL AREA HIGH SCHOOLS; TWO OF THESE STUDENTS WERE SUBSEQUENTLY HIRED AS CLERK STENOGRAPHERS.

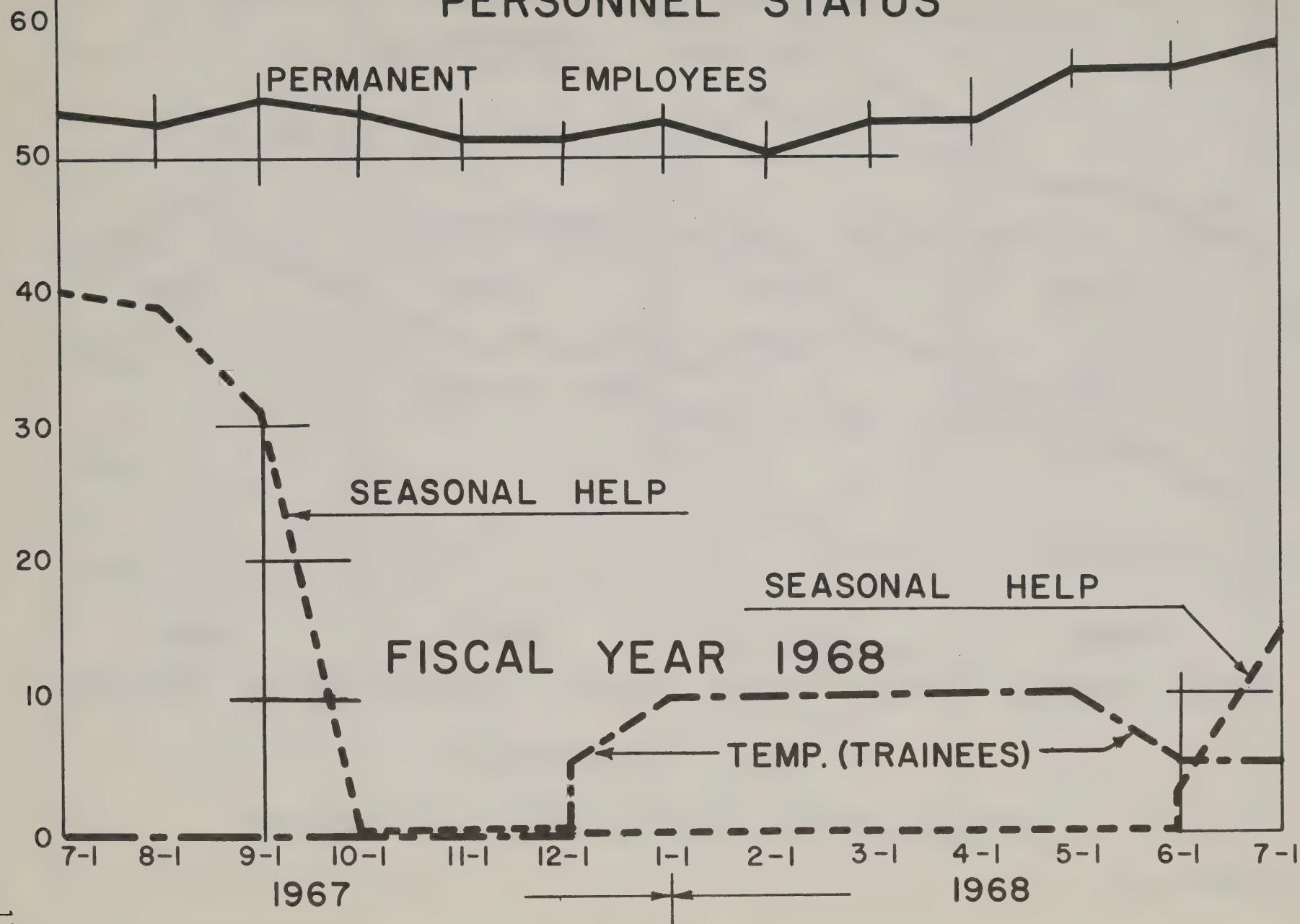
TUITION ASSISTANCE WAS PROVIDED TO 5 RESEARCH ENGINEERS FOR SPECIAL COURSES OF INSTRUCTION, APPROPRIATE TO SPECIFIC JOB ASSIGNMENTS OR FOR COURSES LEADING TO A MASTER'S DEGREE.

The seal of the State of New Jersey is circular. It features a central shield with three horizontal stripes. Above the shield is a crest showing a plow and a sheaf of wheat. The shield is flanked by two figures, Liberty and Justice. The words "THE GREAT SEAL OF THE STATE OF NEW JERSEY" are inscribed around the border. At the bottom, a banner reads "LIBERTY AND JUSTICE UNDER LAW".



JUNE 30, 1968

DIVISION OF RESEARCH AND EVALUATION PERSONNEL STATUS



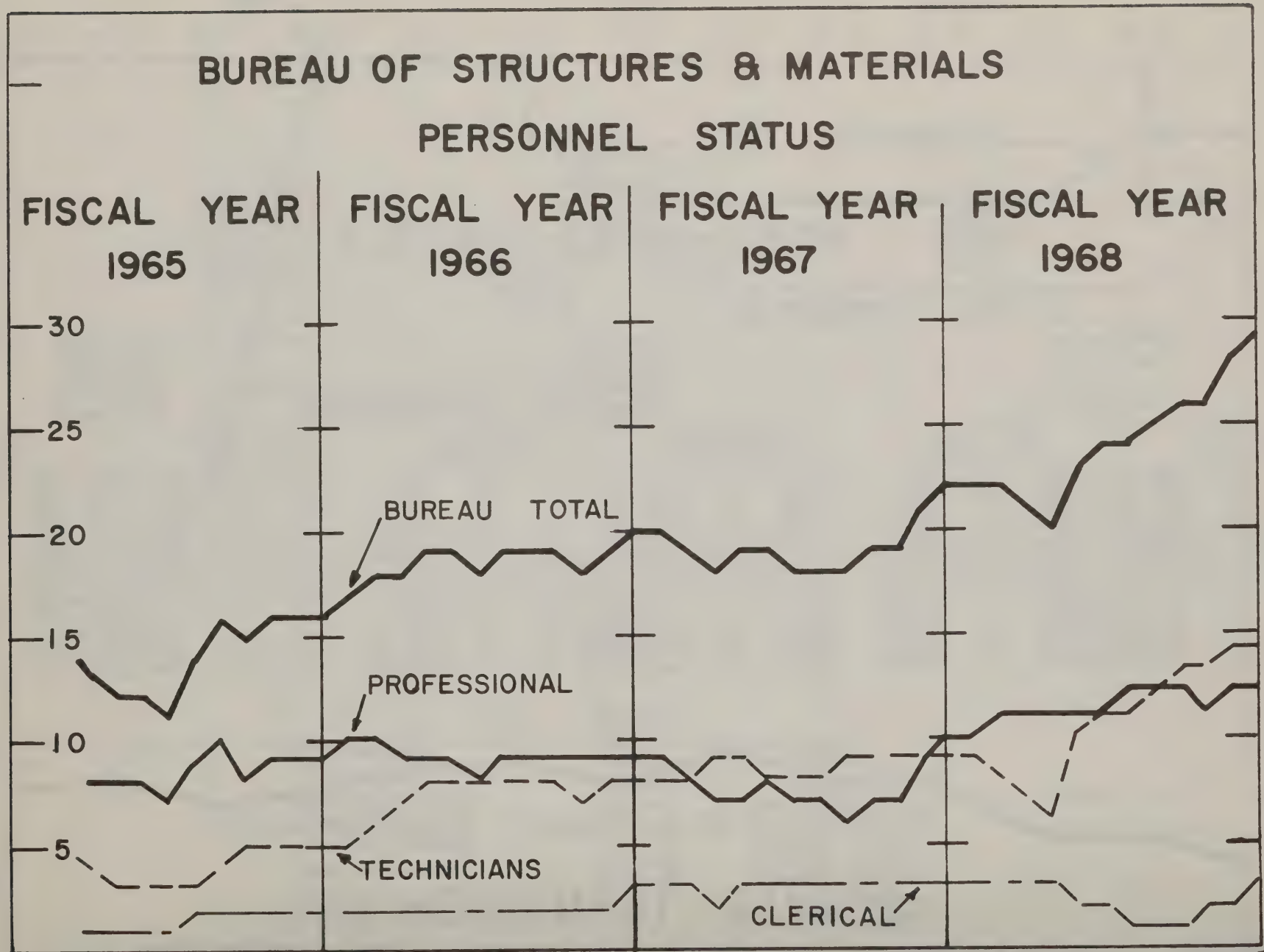


FIG.V

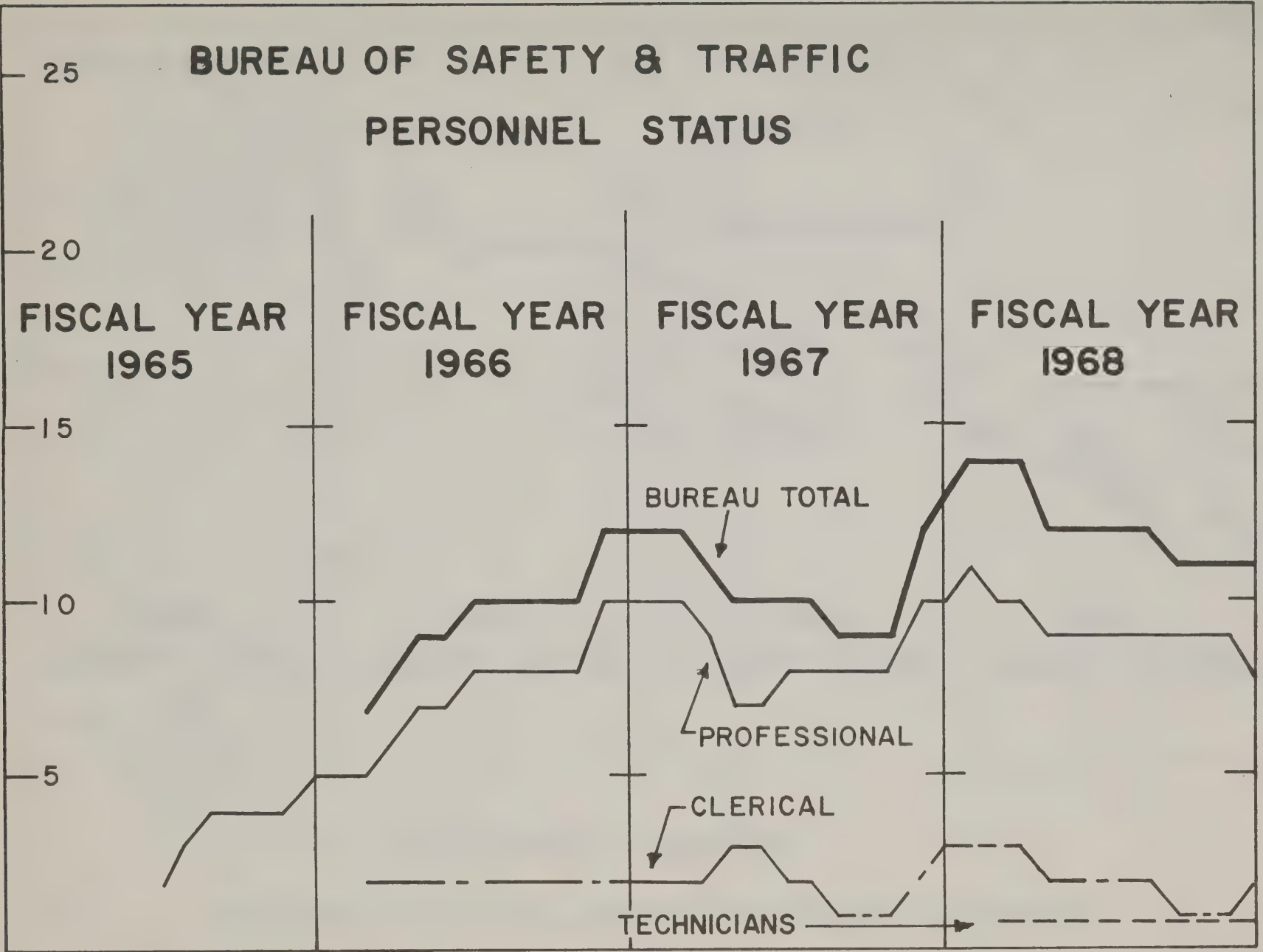


FIG.VI

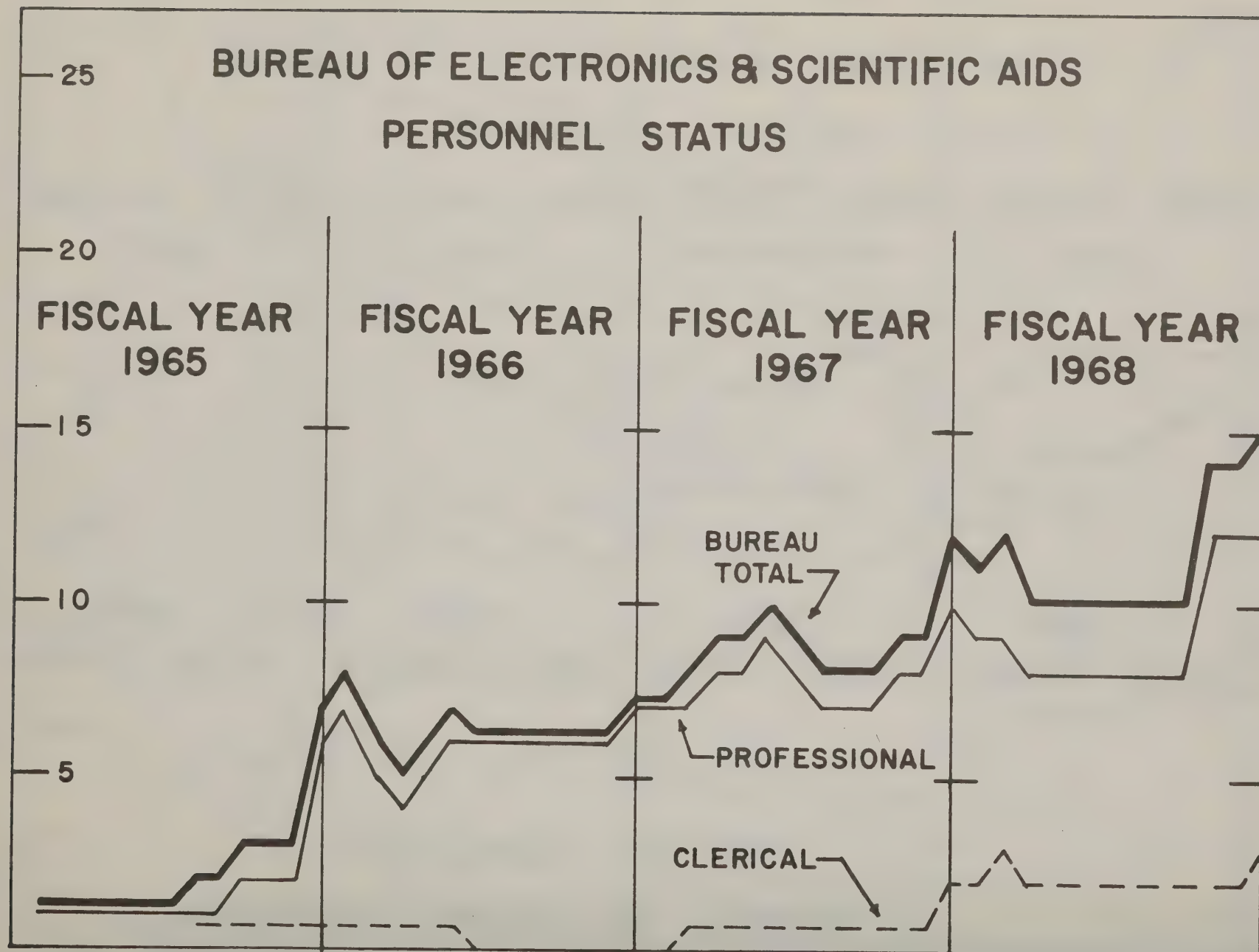


FIG. VII



REPORTS OF THE THREE BUREAUS:

STRUCTURES AND MATERIALS

SAFETY AND TRAFFIC

ELECTRONICS & SCIENTIFIC AIDS



FRANCIS BACON'S METHOD CONSISTED OF THREE STEPS--
TO COLLECT A LARGE NUMBER OF FACTS BY OBSERVATION,
TO DRAW PERSONAL CONCLUSIONS,
TO VERIFY THESE BY EXPERIMENTS;
THIS IS THE FOUNDATION OF ALL,
FOR WE ARE NOT TO SUPPOSE OR IMAGINE
BUT TO DISCOVER WHAT NATURE DOES OR WAS MADE TO DO

BUREAU OF STRUCTURES & MATERIALS

PREFORMED ELASTOMERIC JOINT SEALERS FOR BRIDGES

DURING THE PRECEDING FISCAL YEAR A REPORT REGARDING OUR INITIAL EFFORTS IN THIS AREA WAS COMPLETED. THE CORRESPONDING PAPER WAS PUBLISHED LAST WINTER IN RECORD NO. 200 OF THE H. R. B. IT REPRESENTS THE FOUNDATION FOR CONTINUED RESEARCH, TO CONSIST OF A TWO-PHASE APPROACH, SIMULTANEOUSLY EXECUTED OVER A TIME-SPAN OF APPROXIMATELY FIVE YEARS. THIS RESEARCH WILL BE ACCOMPLISHED BY THE MONITORING OF SEVERAL EXPERIMENTAL STRUCTURES, AS WELL AS THE TESTING OF THE PREFORMED SEALERS BOTH IN THE LABORATORY AND IN OUTDOOR "MODEL JOINT MACHINES", SIMULATING REAL EXPOSURE CONDITIONS. THE SEALERS ARE A RELATIVELY NEW APPLICATION OFFERING CONSIDERABLE POSSIBILITIES FOR WHICH, HOWEVER, MATERIAL AND DESIGN LIMITATIONS HAVE NOT BEEN ADEQUATELY ESTABLISHED.

BRIDGE CONSTRUCTION OF UNPAINTED ASTM A-242 STEEL

THIS PROJECT IS AN APPRAISAL OF THE PERFORMANCE OF UNPAINTED-STEEL BRIDGE CONSTRUCTION, IN ORDER TO DETERMINE ITS POTENTIAL OF MINIMIZING MAINTENANCE REQUIREMENTS WITHOUT SEVERE DEPRECIATION OF APPEARANCE. THE REPORT, INCLUDING THE MONITORING OF AN EXPERIMENTAL BRIDGE NOW UNDER CONSTRUCTION, IS CLOSE TO COMPLETION. A PAPER, EXTRACTED FROM THIS STUDY, WAS PUBLISHED LAST WINTER IN NO. 184 RECORD OF THE H. R. B.

A 16-YEAR PROGRAM OF TESTING SPECIMEN SAMPLES, INSTALLED ON THE EXPERIMENTAL BRIDGE AND THE NEWARK GARAGE ROOF WAS INITIATED.

ANTI-SCALING AGENTS

THE PRESENTATION OF AN INTERIM REPORT, COVERING THE APPLICATION OF THREE SUCH PRODUCTS ON AN EXPERIMENTAL BRIDGE DECK, IS NEARING COMPLETION. THE SCALING OF CONCRETE SURFACES IS USUALLY FOLLOWED BY MORE SERIOUS DETERIORATION; THE USE OF DE-ICING AGENTS AGGRAVATES THIS PHENOMENON. WORK ACCOMPLISHED TO DATE FORMED THE BASIS OF A MORE ELABORATE PROJECT WHICH THE BUREAU ANTICIPATES TO UNDERTAKE IN THE NEAR FUTURE.

BRIDGE METALLIC GRID DECKS

AN EVALUATION OF THE SAFETY CHARACTERISTICS -- EMPHASIZING SKID-RESISTANCE -- OF THE VARIOUS TYPES OF METALLIC-GRID BRIDGE DECKS IN PLACE IN NEW JERSEY. THIS REPORT WAS DISTRIBUTED INTRA-DEPARTMENTALLY FOR COMMENT.

ROUTE 3 BRIDGE

THE SURVEILLANCE OF THIS BRIDGE WHICH HAS HOLLOW FOUNDATIONS OVER A DEEP UNSTABLE MEDIUM WAS CONTINUED. STRUCTURAL MOVEMENTS OF CONSIDERABLE MAGNITUDE HAD BEEN OBSERVED IN THE PAST. CORRECTIVE MEASURES WERE RECOMMENDED AND

CARRIED OUT. THE SURVEILLANCE GOES ON.

OTHER BRIDGE SETTLEMENT EVALUATIONS

THE ROUTE 71 BRIDGE OVER DEAL LAKE, AND THE SOUTH MARGINAL ROAD STRUCTURE OVER PARKWAY AVENUE (LINCOLN TUNNEL APPROACH COMPLEX), REMAINED UNDER SURVEILLANCE.

STATISTICAL CORRELATION AND VARIANCE ANALYSIS

A REPORT, VIRTUALLY COMPLETED (PART I: STRUCTURAL CONCRETE, WAS SUBMITTED TO A STATISTICAL CONSULTANT FOR REVIEW), IS BEING PREPARED ON THIS STUDY WHICH ANALYSES STATISTICALLY: (A) THE VARIANCE IN TESTS OF STRUCTURAL CONCRETE CYLINDERS; (B) THE CORRELATION BETWEEN MIXTURE TESTS AND PAVEMENT TESTS FOR BITUMINOUS PAVEMENTS; AND (C) THE VARIANCE IN SAMPLING, TESTING AND MATERIALS OR OPERATIONS FOR BITUMINOUS PAVEMENTS. THE ACCEPTANCE BY THE DEPARTMENT OF A QUALITY CONTROL PROGRAM WITH A STATISTICAL FOUNDATION, COULD CONCEIVABLY LEAD TO STUDIES OF QUALITY CONTROL PROGRAMS USING STATISTICAL CONCEPTS FOR OTHER CONSTRUCTION MATERIALS AND/OR PROCEDURES. A PRESENTATION ON THE "STATISTICAL STUDY OF ASPHALTIC CONCRETE", EXTRACTED FROM MATERIAL CONTAINED IN THIS PROJECT, WAS GIVEN AT THE 11TH ASPHALT PAVEMENT CONFERENCE AT RUTGERS, AND PUBLISHED BY H. R. B. (NO. 184)

DOLOMITE AGGREGATES

AN INVESTIGATION OF THE RELATIVE SKID RESISTANCE CHARACTERISTICS OF BITUMINOUS SURFACES CONTAINING DOLOMITE

AS THE COARSE AGGREGATE WAS COMPLETED, AND THE CORRESPONDING REPORT ISSUED. FINDINGS INDICATED THAT NOT ALL DOLOMITES PRODUCE ROAD SURFACES WITH LESS SKID RESISTANCE THAN THAT PRODUCED WITH OTHER AGGREGATE TYPES. PERTINENT RECOMMENDATIONS HAVE BEEN MADE ON REQUIRED ADDITIONAL RESEARCH. AFTER THE SUBSEQUENT DELIVERY OF THE SKID TRAILER, WITH THE GREATER DEGREE OF SOPHISTICATION IT AFFORDS, ALL PAVEMENT SURFACES DEALT WITH IN THIS REPORT WILL BE RETESTED AND A SUPPLEMENTAL REPORT WILL BE PREPARED.

SKID RESISTANCE

DELIVERY OF THE FIELD SKID-TESTING TRAILER, DEVELOPED BY STEVENS INSTITUTE OF TECHNOLOGY UNDER AN AGREEMENT WITH THE DEPARTMENT OF TRANSPORTATION, WAS ACCEPTED BY THIS BUREAU IN THE NAME OF THE DEPARTMENT. THE DEVICE, CONSTRUCTED BASICALLY IN ACCORDANCE WITH ASTM TENTATIVE SPECIFICATIONS, WILL PROVIDE THE BUREAU WITH THE ABILITY WITH CONDUCT SKID TESTS AND TO PERFORM RESEARCH ON PAVEMENT SURFACE SKID PROPERTIES WITHIN NATIONALLY ACCEPTED PROCEDURES. A MEMORANDUM-REPORT BY THE STEVENS INSTITUTE ON THE PROOF-TESTING OF THIS DEVICE WILL BE FORTHCOMING SHORTLY. IT WILL ALSO GIVE AN ACCOUNT OF THE FLORIDA SKID CORRELATION CONFERENCE, OF SOME MEASUREMENTS ON NEW JERSEY ROADWAY SURFACES AND OF LIMITED TESTS OF "MICRO-SIPED" TIRES.

SKID RESISTANT ROADWAY SURFACES

AN EVALUATION OR DEVELOPMENT OF SUITABLE ROADWAY SURFACING MATERIALS EXHIBITING SUPERIOR SKID RESISTANCE

CHARACTERISTICS WAS INITIATED. THE SKID TRAILER WILL BE THE PRIME DEVICE USED FOR THE EVALUATION. IN CONJUNCTION WITH THIS PROGRAM A SUPPLEMENTARY GUIDE-LINE WAS PREPARED ON VARIOUS DEVICES AVAILABLE FOR STUDYING THE RELEVANT PAVEMENT SURFACE CHARACTERISTICS, WITH AN OUTLINE OF SUGGESTED ADDITIONAL RESEARCH.

PAVEMENT RECOMMENDATIONS

IN COLLABORATION WITH THE SOILS BUREAU, PAVEMENT DESIGNS WERE RECOMMENDED FOR 27 DESIGN PROJECTS. THE DESIGNS APPLIED NOT ONLY TO MAIN-LINE ROADWAYS, BUT INCLUDED THE RAMPS, THE U-TURN FACILITIES, AND THE INDICATED CONNECTING ROADS AS WELL. THIS WORK FREQUENTLY INVOLVED THE DEVELOPMENT OF SUITABLE MEANS FOR THE REHABILITATION OF DETERIORATED PAVEMENTS.

EXPERIMENTAL PAVEMENT

THE RELATIVE PERFORMANCE OF THE VARIOUS TYPES OF BASE COURSE MATERIALS COMMONLY USED IN NEW JERSEY IS BEING APPRAISED ON A CONTINUING BASIS. EXPERIMENTAL SECTIONS WERE CONSTRUCTED ON ROUTE I-80, SECTION 5V AND ROUTE I-95, SECTION 1R. THE RESULTS OF THIS STUDY SHOULD IMPROVE THE FUTURE DESIGNING OF FLEXIBLE PAVEMENTS IN NEW JERSEY. A PROGRESS REPORT WAS PRESENTED AT THE 11TH NEW JERSEY ASPHALT PAVEMENT CONFERENCE HELD AT RUTGERS.

COMPOSITE PAVEMENT

THE PERFORMANCE OF A COMPOSITE PAVEMENT CONSTRUCTED ON ROUTE 3 IN THE

SECAUCUS AREA, AND SUBJECTED TO A LARGE VOLUME OF HEAVY TRUCK TRAFFIC, IS UNDER EXAMINATION WITH PARTICULAR REGARD TO SURFACE CONTINUITY. THIS TYPE OF PAVEMENT CONSTRUCTION HAS CONSIDERABLE POTENTIAL TO SELECTIVELY IMPROVE PAVEMENT PERFORMANCE. PERFORMANCE REPORTS ARE MADE ANNUALLY; A PAPER ON THE FINDINGS TO DATE WAS PRESENTED AT THE JANUARY 1968 MEETING OF THE HIGHWAY RESEARCH BOARD.

COLOR PAVEMENTS

THE SURVEILLANCE OF AN EXPERIMENTAL INSTALLATION OF A PARTICULAR TYPE OF COLORED PAVEMENT WAS CONTINUED. THE USE OF COLORED MATERIALS ON HIGHWAYS MAY PROVIDE INCREASED SAFETY BY MORE EFFECTIVE COMMUNICATIONS TO THE TRAVELLING PUBLIC.

PAVEMENT RIDING QUALITY

A ROUGHOMETER USED TO MEASURE THE RIDING QUALITIES OF ROADWAYS WAS ACQUIRED DURING FISCAL YEAR 1968. THE BUREAU IS CURRENTLY DETERMINING THE RIDING QUALITIES OF RECENTLY CONSTRUCTED PAVEMENTS, AND DETERMINING AN INDEX OF PAVEMENT ROUGHNESS, SO AS TO BETTER DEFINE THE EXTENT AND SERIOUSNESS OF THE PROBLEM. PREVIOUS RESEARCH BY OTHERS INDICATES THAT IMPROVEMENTS IN THIS REPORT SHOULD INCREASE THE USEFUL LIFE OF PAVEMENTS.

CONCRETE PAVEMENT DAMAGE

THIS WAS A STUDY OF PAVEMENT DAMAGE -- COMMONLY REFERRED TO AS A "BLOW-UP" -- RESULTING FROM THERMAL EFFECTS AND THE PRESENCE OF INCOMPRESSIBLE MATERIALS IN

PAVEMENT JOINTS. OUR REPORT WAS GIVEN INTRA-DEPARTMENTAL DISTRIBUTION FOR COMMENT.

PAVEMENT PATCHING TECHNIQUES AND MATERIALS

PAVEMENT PATCHING IS A PROBLEM THAT NOT ONLY PLAGUES MAINTENANCE FORCES BUT THE MOTORING PUBLIC AS WELL. RISING COSTS, COUPLED WITH THE MILES OF NEWLY CONSTRUCTED HIGHWAYS, WILL SOON PLACE AN AWESOME BURDEN ON HIGHWAY MAINTENANCE BUDGETS. A DETAILED WORK PLAN HAS BEEN PREPARED FOR DEVELOPING OPTIONAL TECHNIQUES AND MATERIALS.

RUMBLE STRIPS

A REPORT ON THE EXPERIMENTAL INSTALLATION OF RUMBLE STRIPS INSTALLED AT THE RED LION CIRCLE (ROUTE U. S. 206, AT ROUTE 70) WAS COMPLETED. THE REPORT DESCRIBES A MATERIALS-AND-APPLICATION STUDY OF VARIOUS METHODS TO INTRODUCE AN AUDIBLE AND VIBRATORY EFFECT INTO A PAVEMENT, FOR WARNING MOTORISTS APPROACHING A POTENTIALLY HAZARDOUS SITUATION, SUCH AS A TRAFFIC CIRCLE, A TRAFFIC SIGNAL, ETC. THE EXPERIMENTAL INSTALLATION WAS CONSIDERED SUCCESSFUL AND THIS PROJECT IS CONSIDERED COMPLETED. BASED ON FINDINGS CONTAINED THEREIN, A RECOMMENDATION FOR A SIMILAR INSTALLATION ON THE APPROACHES TO THE ROUTE U. S. 1 AND ROUTE U. S. 130 TRAFFIC CIRCLE WAS MADE AND ACCEPTED. ITS CONSTRUCTION SHOULD BE COMPLETED IN THE FALL OF 1968.

RELATION OF HIGHWAY CONSTRUCTION PRACTICES TO STREAM SEDIMENTATION AND STREAM FLOW RATES

THE SPECIFIC AIM OF THIS PROJECT IS TO APPRAISE THE EFFECTS OF HIGHWAY CONSTRUCTION (ROUTE I-95) ON SOIL EROSION, STREAM SEDIMENTATION, STREAM FLOW RATES AND AQUATIC BIOTA IN SMALL DRAINAGE AREAS CROSSED BY THE HIGHWAY IN THE STONY BROOK BASIN, NEW JERSEY. THE PROJECT IS UNDERTAKEN IN COOPERATION WITH THE U. S. GEOLOGICAL SURVEY. EFFORTS TO DATE HAVE BEEN LIMITED TO PRELIMINARY PLANNING, AND TO THE COLLECTING OF PRE-CONSTRUCTION DATA, IN ORDER TO DEFINE ANTECEDENT CONDITIONS.

INLET GRATINGS AND MANHOLE COVERS

PROTOTYPE STEEL GRATINGS AND FRAMES NOT PREVIOUSLY USED IN NEW JERSEY, WERE INSTALLED FOR EVALUATION AT SPECIFIC LOCATIONS ON THE STATE HIGHWAY SYSTEM. DECREASED INITIAL AND MAINTENANCE COSTS AND GREATER EFFICIENCY IN THE HANDLING OF SURFACE DRAINAGE HAD BEEN ANTICIPATED, BUT RESULTS TO DATE HAVE BEEN DISCOURAGING. A REPORT IS IN THE PROCESS OF PREPARATION.

CHAIN LINK FENCE EVALUATION

THE CURRENT DEPARTMENTAL PRACTICE REGARDING THE USE OF CHAIN LINK FENCE WAS EVALUATED AND A STUDY MADE OF THE FEASIBILITY OF UTILIZING NEWER FENCING MATERIALS CURRENTLY AVAILABLE. A REPORT ON THIS SUBJECT IS IN THE FINAL STAGES OF PREPARATION.

MISCELLANEOUS

ALTHOUGH TERMED MISCELLANEOUS, CONSIDERABLE EFFORTS WERE EXPANDED IN PERFORMING EMERGENCY OR ADVISORY SERVICES

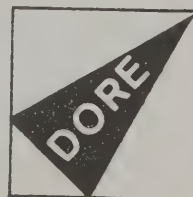
FOR THE DEPARTMENT WITH RESPECT TO PAVEMENTS, BRIDGES, MATERIALS, AND EQUIPMENT. AMONG SOME OF THESE SERVICES WERE: (1) DEVELOPMENT OF STATISTICAL TOLERANCE SPECIFICATIONS FOR BITUMINOUS CONCRETE; (2) DEVELOPMENT AS STATISTICAL PROCEDURES FOR A LABORATORY INVESTIGATION INTO THE QUALITY CONTROL OF BASE-COURSE AGGREGATES; (3) REVIEWING OF PROPOSED REVISIONS TO THE STANDARD SPECIFICATIONS; (4) REVIEW OF NEW SPECIFICATIONS; (5) PARTICIPATION IN THE DEPARTMENT'S MATERIALS AND EQUIPMENT COMMITTEES.

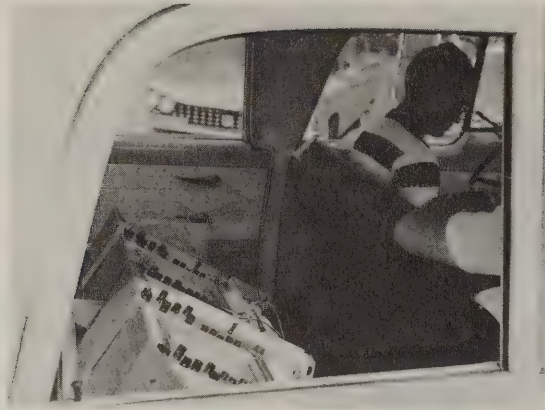
FUTURE RESEARCH

PRELIMINARY CONTACTS HAVE BEEN STARTED WITH RUTGERS, THE STATE UNIVERSITY, FOR TWO PROGRAMS OF COOPERATIVE RESEARCH ON STRESSES IN HIGHWAY STRUCTURES: ONE IS TO COVER THE FATIGUE LIFE OF BRIDGES UNDER BOTH PRESENT AND FUTURE TRAFFIC CONDITIONS; THE OTHER WILL CONCENTRATE ON HORIZONTALLY CURVED GIRDER BRIDGES.

PRELIMINARY STUDIES ARE UNDER WAY ON A SYSTEM OF REFLECTORIZED BARRIER CURBS, BASED ON INSTALLING PLANE SURFACES PERPENDICULARLY TO THE HEADLIGHTS OF THE APPROACHING VEHICLES.

ON THE OTHER HAND, WORK ON A COMPREHENSIVE EVALUATION OF THE CURRENT STANDARD DESIGN USED IN NEW JERSEY FOR PORTLAND CEMENT CONCRETE PAVEMENT WAS TEMPORARILY HALTED DUE TO A SHORTAGE OF QUALIFIED PERSONNEL.

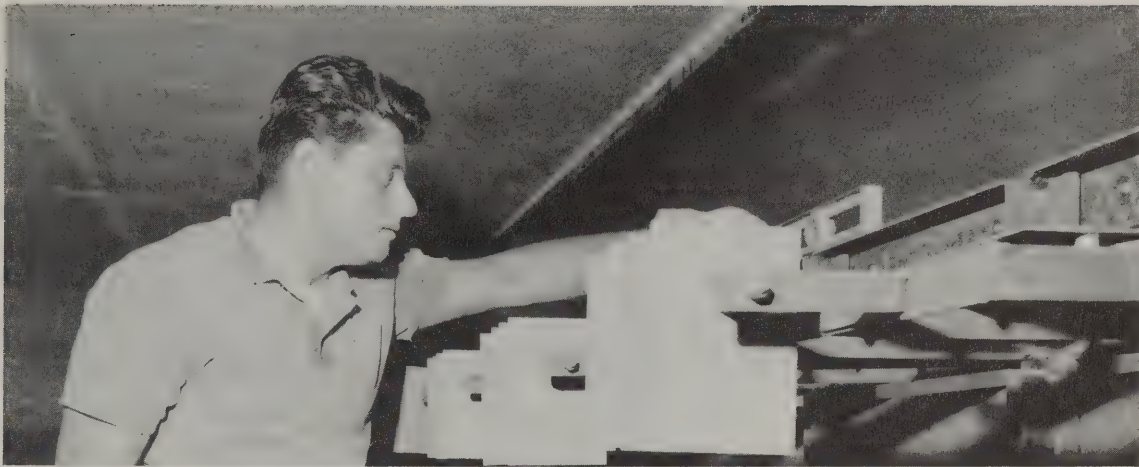




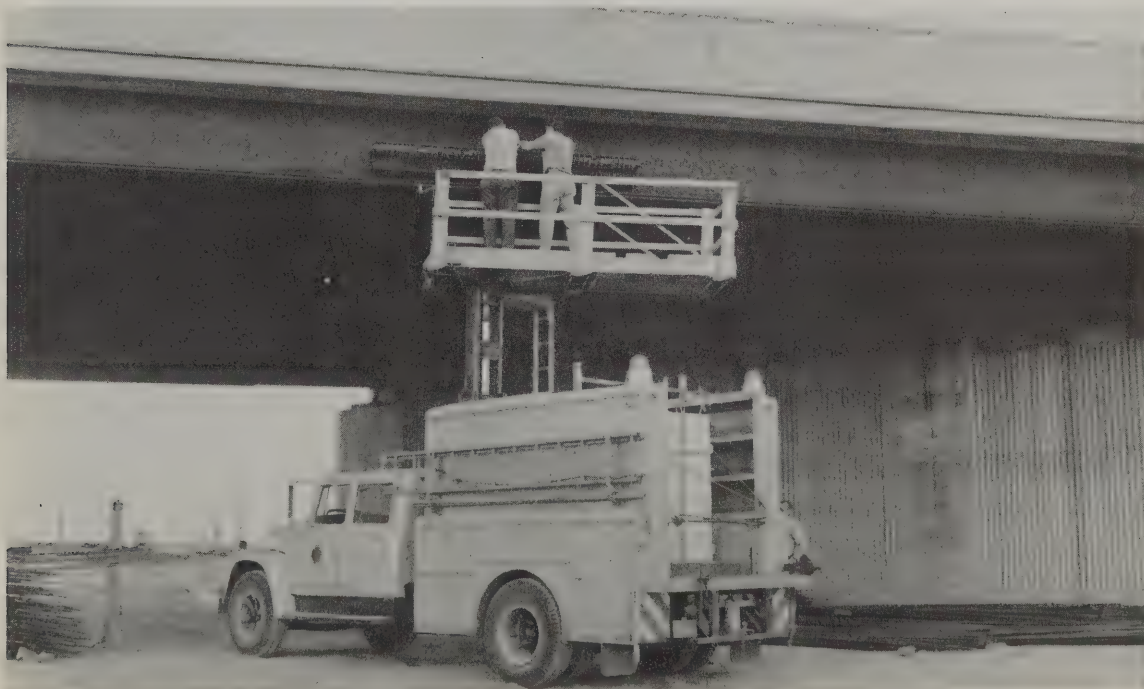
THE DEPARTMENT'S SKID-TESTING TRAILER, BUILT BY THE STEVENS INSTITUTE OF TECHNOLOGY IN BASIC ACCORDANCE WITH ASTM TENTATIVE SPECIFICATIONS, HAS BEEN DELIVERED TO THE DIVISION.

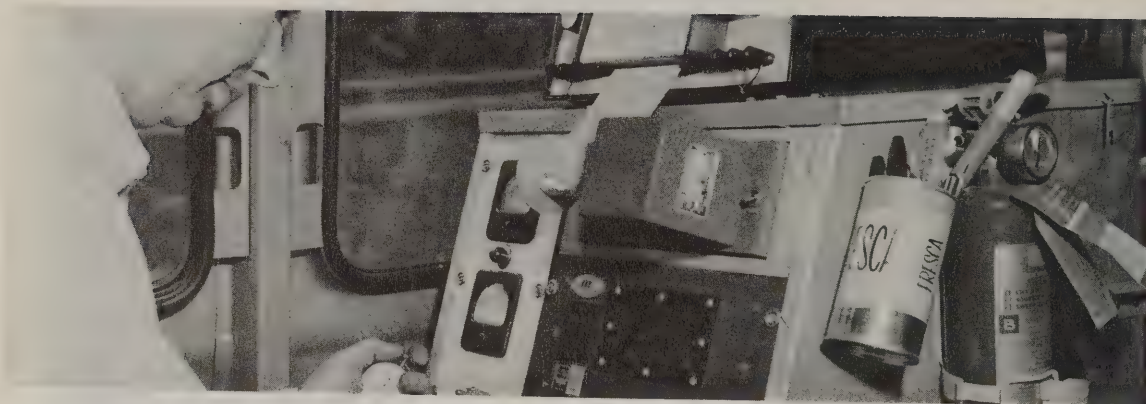
WITH THE GREATER DEGREE OF SOPHISTICATION IT AFFORDS, THIS NEW INSTRUMENT WILL ENABLE DORE TO PERFORM RESEARCH ON PAVEMENT SKID PROPERTIES WITHIN NATIONALLY ACCEPTED PROCEDURES.



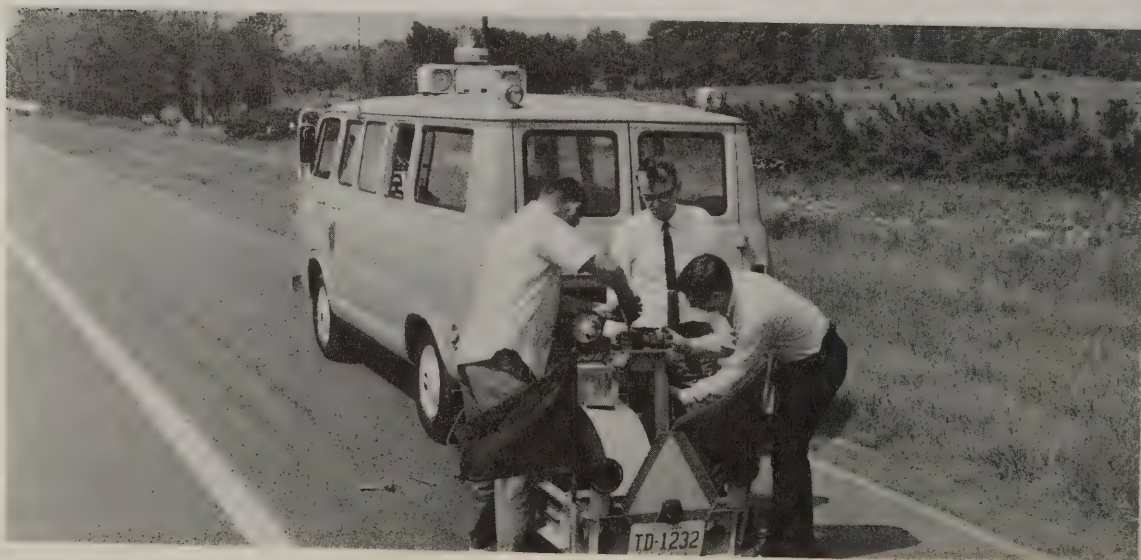
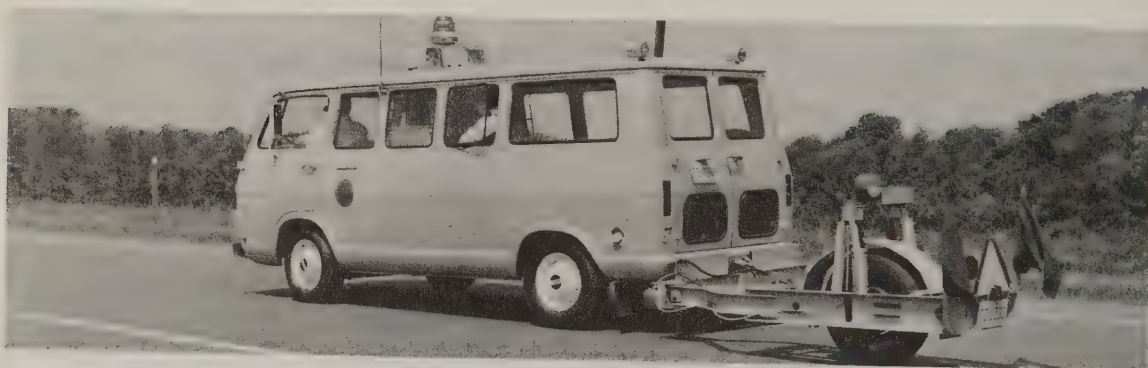


SAMPLES OF LOW-ALLOY, HIGH-STRENGTH STEEL ARE INSTALLED FOR EX-
POSURE TESTING UNDER EXPERIMENTAL BRIDGE NO. 9 ON ROUTE 78, SECTION 5V, ON
THE EASTBOUND OUTER ROADWAY UNDERPASS AT RAMP 1.





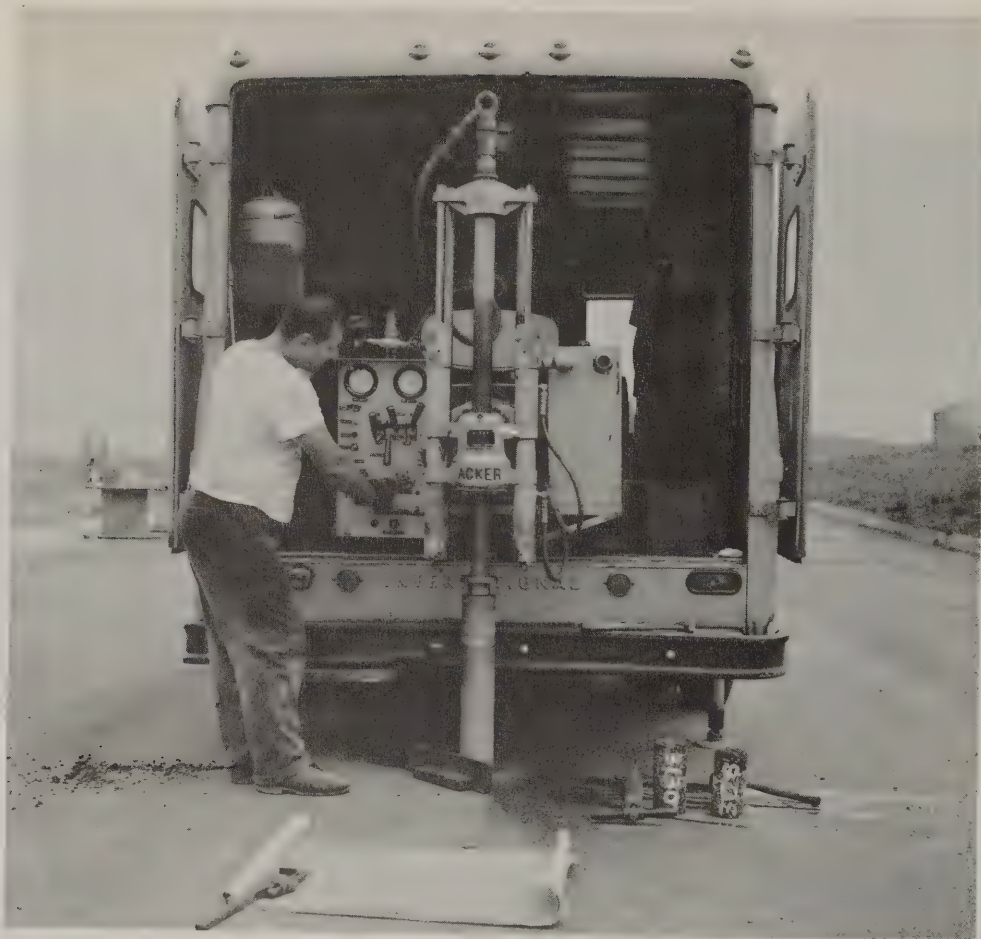
DORE'S ROUGHOMETER IN ACTION ON N. J. ROUTE 129, AT SCOTCH ROAD.





OZONE-RESISTANCE TESTING, AS PART OF THE DEVELOPMENT OF ASTM SPECIFICATIONS FOR PREFORMED ELASTOMERIC BRIDGE JOINT SEALERS, IN DORE'S OZONE CHAMBER AT FERNWOOD.





DRILLINGS OF CORES FOR PAVEMENT RESEARCH, WITH THE HELP
AND EQUIPMENT OF THE DIVISION OF MATERIALS.



BUREAU OF SAFETY & TRAFFIC

MILEPOST SYSTEM

AN INVENTORY OF ALL INTERSECTIONS AND LANDMARKS ON THE STATE'S HIGHWAYS HAS BEEN TABULATED TO COMPLETE THE MILEPOST SYSTEM, WHICH WAS INSTALLED ON ALL NEW JERSEY ROADS. A SYSTEM OF ANALYSIS HAS BEEN DEVELOPED THAT WILL MAKE IT POSSIBLE FOR EVERY ACCIDENT TO BE "MILEPOSTED." THIS INTEGRATED REFERENCE SYSTEM WILL PERMIT MORE ACCURATE SUFFICIENCY RATINGS AND MORE EFFECTIVE SAFETY PROGRAMS.

A REPORT BY THIS BUREAU ON THE MILEPOST SYSTEM HAS BEEN PUBLISHED IN "TRAFFIC ENGINEERING" MAGAZINE.

TRUCK EQUIVALENT

THE DETERMINATION OF THE PASSENGER-CAR EQUIVALENT OF A TRUCK CONTINUES FOR VARIOUS CONDITIONS OF GRADE, VOLUME DENSITY, CURVATURE, ACCELERATION AND DECELERATION. THREE REPORTS HAVE ALREADY BEEN COMPLETED, TWO OF WHICH HAVE BEEN PRESENTED AT HRB MEETINGS IN WASHINGTON. TO DATE THESE REPORTS SUMMARIZE TRUCK EQUIVALENCY AT A SIGNALIZED LOCATION, AT AN ENTRANCE RAMP AND ON A MULTILANE ROADWAY.

COLORED PAVEMENTS

WITHIN THE NEXT FEW MONTHS, THE ACCIDENT EXPERIENCE FOR THE PREVIOUS YEAR WILL BE TABULATED FOR A "BEFORE-AFTER" COMPARISON ON THE EXPERIMENTAL INSTALLATION MADE IN JUNE 1967 AT THE JUNCTION OF ROUTES 206 AND 68 IN BURLINGTON COUNTY.

COLORED SURFACING IS BEING TESTED TO HELP THE DRIVER TO BETTER DEFINE THE ROADWAYS, RAMPS AND ACCELERATION LANES. PRELIMINARY OBSERVATIONS WERE ON LEFT TURN SPEEDS AS WELL AS ACCEPTED AND REJECTED GAPS, BEFORE AND AFTER THE INSTALLATIONS; THE RED PAVEMENT SEEMED TO LOWER THE SPEEDS BUT DID NOT CHANGE THE ACCEPTED OR REJECTED GAP.

YIELD SIGN STUDY

TWO VARIATIONS OF YIELD SIGN COLORS WERE COMPARED TO THE EXISTING YELLOW BACKGROUND. AT THE SIX SITES USED IN THE STUDY, TRAFFIC REACTED MORE RESTRICTIVELY TO THE RED YIELD SIGN THAN TO THE YELLOW OR WHITE ONES. THE RESULTS OF THE STUDY COULD BE USED BY THE "NATIONAL JOINT COMMITTEE ON UNIFORM TRAFFIC CONTROL DEVICES" IN SPECIFYING THE REGULATORY LIMITS DESIRABLE FOR YIELD SIGNS.

ECONOMIC BENEFITS FROM SCENIC ENHANCEMENT OF HIGHWAYS

THE BUREAU HAS COOPERATED WITH RUTGERS UNIVERSITY AND THE BUREAU OF PUBLIC ROADS TO DETERMINE THE BENEFITS IN ACCIDENT AND INJURY REDUCTION DERIVED FROM THE CONSTRUCTION OF SCENIC ROUTES. THE REPORT HAS DEVELOPED A GUIDELINE TO SCENIC ROUTE CONSTRUCTION IN THE FORM OF A PROJECTION OF PLEASURE DAYS OF DRIVING FOR EACH COUNTY IN NEW JERSEY.

CAPACITY OF DESIGN FEATURES

AS PART OF AN OVERALL PROJECT TO DETERMINE CAPACITIES ON DETOUR ROUTES, A STUDY WAS CONDUCTED AT FOUR SUCH INTERSECTIONS. THE NUMBER OF VEHICLES MAKING LEFT TURNS DURING PEAK HOURS COMPARED FAVORABLY WITH THE TRAFFIC SIGNAL CAPACITY CHART DEVELOPED BY W.R. BELLIS, CONSIDERING THAT THE OBSERVATIONS WERE MADE ON AN ASSUMED INFERIOR, WELL SUPERVISED, DETOUR ROUTE.

INTERSECTION DESIGN

VARIOUS TYPES OF INTERSECTION DESIGN ARE BEING ANALYZED ON A CONTINUING BASIS IN ORDER TO COMPARE THEIR DESIGN ELEMENTS. THE ENSUING CRITICAL REVIEW OF THE EFFICIENCY AND SAFETY OF MANY TYPES OF INTERSECTION DESIGN SHOULD RESULT IN IMPROVED DESIGN POLICIES. A PRELIMINARY REPORT HAS BEEN DELIVERED IN

COMMITTEE AT THE ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD IN JANUARY 1968.

ACCIDENT DESIGN RELATIONSHIP

TWO REPORTS HAVE BEEN COMPLETED, COVERING FOUR LOCATIONS; FOR EACH LOCATION THE RELATIONSHIPS BETWEEN ACCIDENT AND INJURY RATES AND HOURLY TRAFFIC VOLUME VARIATIONS WERE DETERMINED. THE RESULTS OF THE STUDY SHOULD FACILITATE THE EXPLANATION OF THE VARIATIONS IN ACCIDENT RATES AT DIFFERENT LOCATIONS, AND LEAD TO IMPROVEMENTS IN DESIGN AND BETTER SAFETY CONTROL MEASURES. THE FIRST OF THE TWO REPORTS HAS BEEN PUBLISHED IN "TRAFFIC QUARTERLY" MAGAZINE.

FATAL ACCIDENTS

THREE TYPES OF FATAL MOTOR VEHICLE ACCIDENTS THAT OCCURRED IN 1965 ARE BEING CLASSIFIED AND CODED. CONSIDERATIONS WILL BE GIVEN TO ENVIRONMENTAL AND CIRCUMSTANTIAL FACTORS, AS WELL AS VEHICLE AND DRIVER CHARACTERISTICS, ESPECIALLY BLOOD ALCOHOL. THE FINDINGS WILL BE EVALUATED AND AN EFFORT MADE TO IMPROVE THE METHODS OF REPORTING THE ACCIDENTS.

MANPOWER NEEDS

THE STATE HIGHWAY ENGINEER REQUESTED A STUDY OF SURVEY AND DESIGN MANPOWER NEEDS FOR HIGHWAY CONSTRUCTION PROJECTS. A

PRELIMINARY REPORT HAS BEEN COMPLETED ON THE TECHNIQUE OF ESTIMATING THE SURVEY-MANPOWER NEEDS. THE ANALYSIS OF MANPOWER NEEDS FOR DESIGN CONTINUES.

HIGHWAY DELINEATION

THE FREQUENCY OF "RUN OFF THE ROAD" ACCIDENTS MAKES IT NECESSARY TO USE HIGHLY VISIBLE MATERIALS AND/OR DELINEATORS TO AID THE DRIVER IN DISTINGUISHING THE ROADWAY ELEMENTS. THE BUREAU HAS EVALUATED THE VISIBILITY AND MAINTAINABILITY OF SEVERAL KINDS OF REFLECTIVE PAVEMENT MARKERS IN RELATION TO THEIR FIELD LOCATIONS. WHILE NIGHT VISIBILITY OF ROADWAY ELEMENTS WAS GREATLY IMPROVED, IT WAS FOUND THAT THE MARKERS WERE VERY SUSCEPTIBLE TO DAMAGE BY SNOW REMOVAL EQUIPMENT.

TRIP GENERATION IN RURAL AREAS

ZONAL TRIP GENERATION IS BEING INVESTIGATED FOR HOME, WORK AND NON-HOME BASED TRIPS. EQUATIONS FOR TRIP PREDICTION ARE BEING DEVELOPED FROM SOCIAL AND ECONOMIC FACTORS. ANALYSIS OF TRIP DISTRIBUTION IS ALSO BEING STUDIED, USING TWO METHODS OF DISTRIBUTION.

SPEED STUDIES

A DEGREE OF EFFICIENCY IS BEING EVALUATED FOR FOUR TYPES

OF ROADWAYS THROUGH A STUDY OF VEHICLE SPEED VARIATIONS UNDER VARIOUS TRAFFIC CONDITIONS. "ACCELERATION NOISE" AND GREEN-SHIELD'S "QUALITY INDEX" ARE USED TO DEVELOP A PRACTICAL METHOD FOR THE EFFICIENCY RATING OF THE ROADS OF THE STATE.

RAMP LOCATION AT NEWARK AIRPORT INTERCHANGE

THE PLANNING OF AN EXIT RAMP, SERVICING PRIVATE LEVEL USE IN CLOSE PROXIMITY TO THE NEW JERSEY TURNPIKE TOLL PLAZA, CALLED FOR A TRAFFIC OPERATIONS INVESTIGATION. THE LAYOUT AND VOLUME OF TURNPIKE-SERVICED VEHICLES AND THE OPERATIONAL AND ACCIDENT EXPERIENCE OF SIMILAR SITUATIONS LED TO A RECOMMENDED REJECTION OF THE PLAN.

REST AREA INVENTORY

AN INVENTORY WAS MADE OF THE ROADSIDE REST AND INFORMATION CENTERS THROUGHOUT THE COUNTRY. FORTY-NINE STATES, AS WELL AS THE BUREAU OF PUBLIC ROADS, WERE ASKED TO FURNISH ALL AVAILABLE DATA. THIRTY PERCENT OF THE STATES DID NOT HAVE ANY INFORMATION CENTERS. THE STATES WITH INFORMATION CENTERS WERE VERY COOPERATIVE: DESCRIPTIVE MATERIALS, PHOTOGRAPHS AND COST ESTIMATES ARE NOW ON FILE, TO BE USED AS GUIDELINES FOR THE STATE OF NEW JERSEY.

CONTINUED

TRUCK SPECIFICATIONS

LEGISLATION TO PERMIT LARGER AND HEAVIER TRUCKS TO USE THE NEW JERSEY HIGHWAY SYSTEM MADE NECESSARY AN INVESTIGATION OF THE OPERATING CHARACTERISTICS OF THE LARGER VEHICLES. DATA ON ACCIDENT EXPERIENCE WERE OBTAINED FROM STATES PERMITTING THE USE OF LARGER TRUCKS. THE INVESTIGATION INDICATED ACCEPTANCE OF THE INCREASED SIZE TRUCKS.

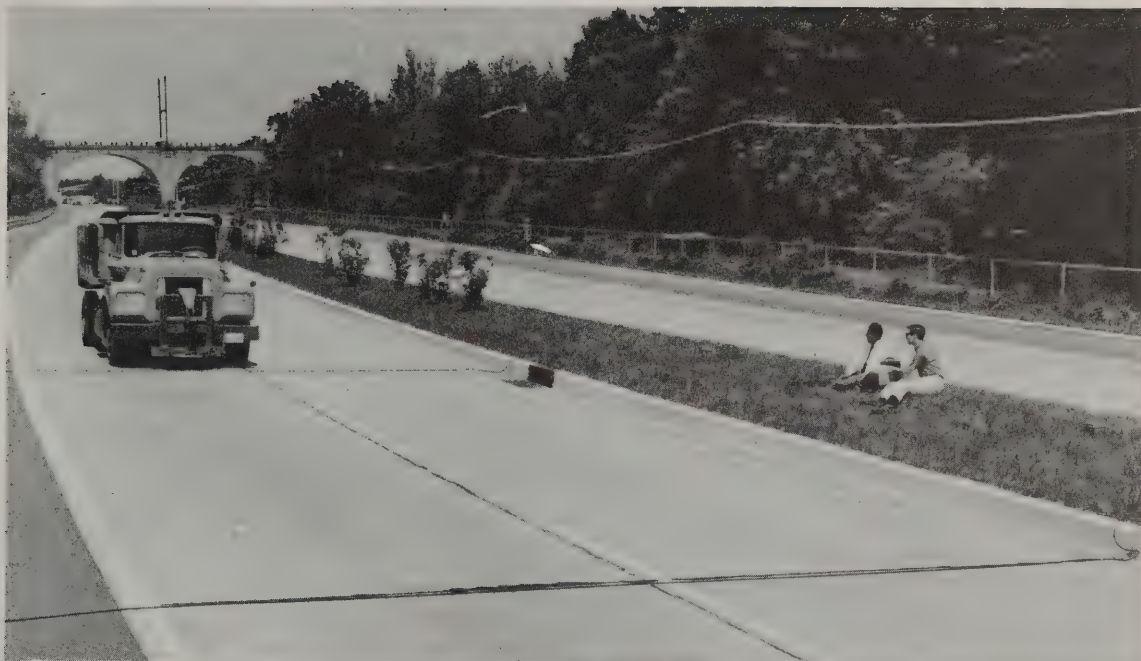
MARGINAL FRICTION

IT HAS LONG BEEN ASSUMED THAT ACCIDENTS INCREASE WITH AN INCREASE IN MARGINAL FRICTION. A SAMPLE OF MORE THAN 500 MILES OF STATE ROUTES WAS INVENTORIED AND COMPARED BY TYPE OF ACCESS AND ACCIDENT SEVERITY. ANALYSIS IS UNDER WAY.

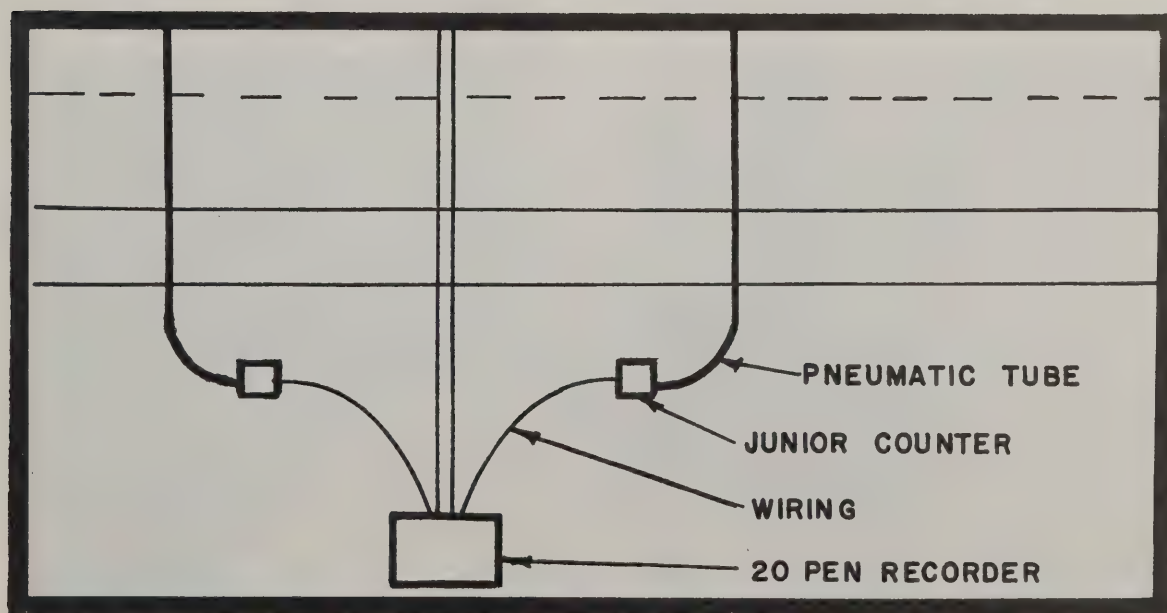
SUFFICIENCY RATINGS

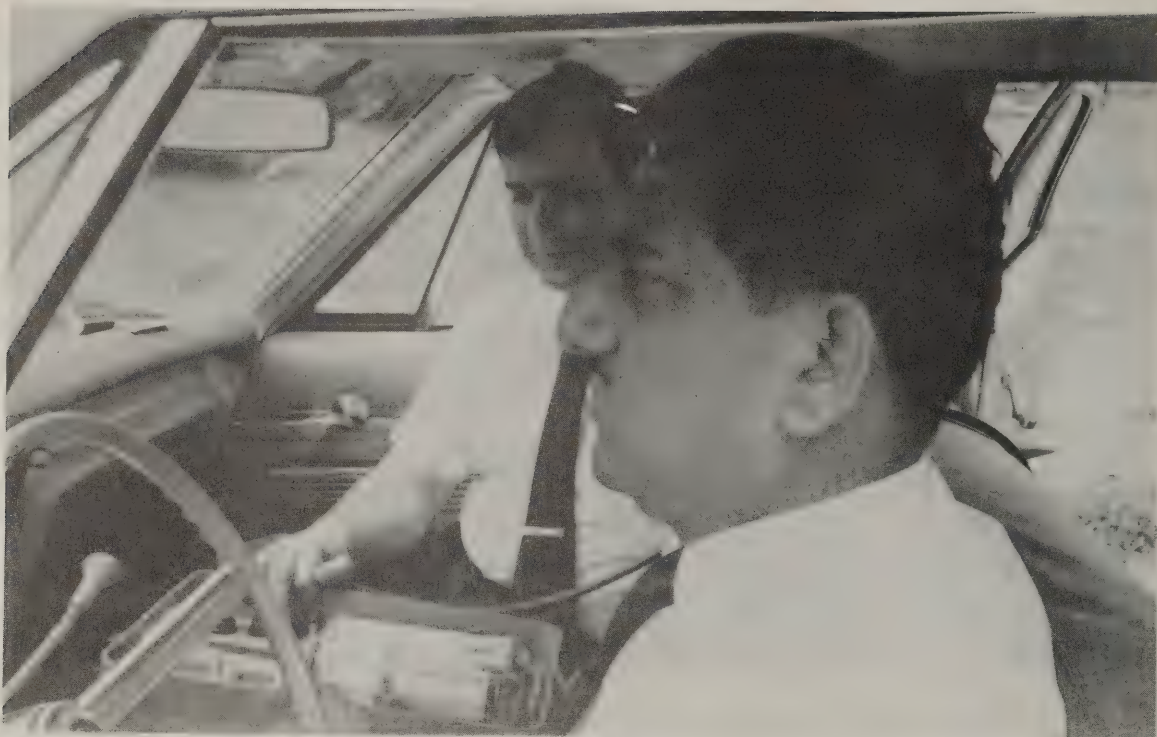
THIS STUDY WILL DEFINE A METHOD FOR DETERMINING RECONSTRUCTION PRIORITIES BY MEASURING THE RELEVANT PARAMETERS IN ACCORDANCE WITH THE NEEDS OF THE STATE. EVALUATING THE HIGHWAY SYSTEM ON THE BASIS OF SUFFICIENCY RATINGS WILL HELP TRAFFIC ENGINEERS TO ESTABLISH CONSTRUCTION AND IMPROVEMENT PRIORITIES IN ORDER TO INCREASE CAPACITY AND SAFETY. IT WILL ALSO MAKE POSSIBLE THE MOST ADEQUATE APPROPRIATIONS OF REVENUES TO THE NECESSARY IMPROVEMENTS OF THE HIGHWAY SYSTEM.



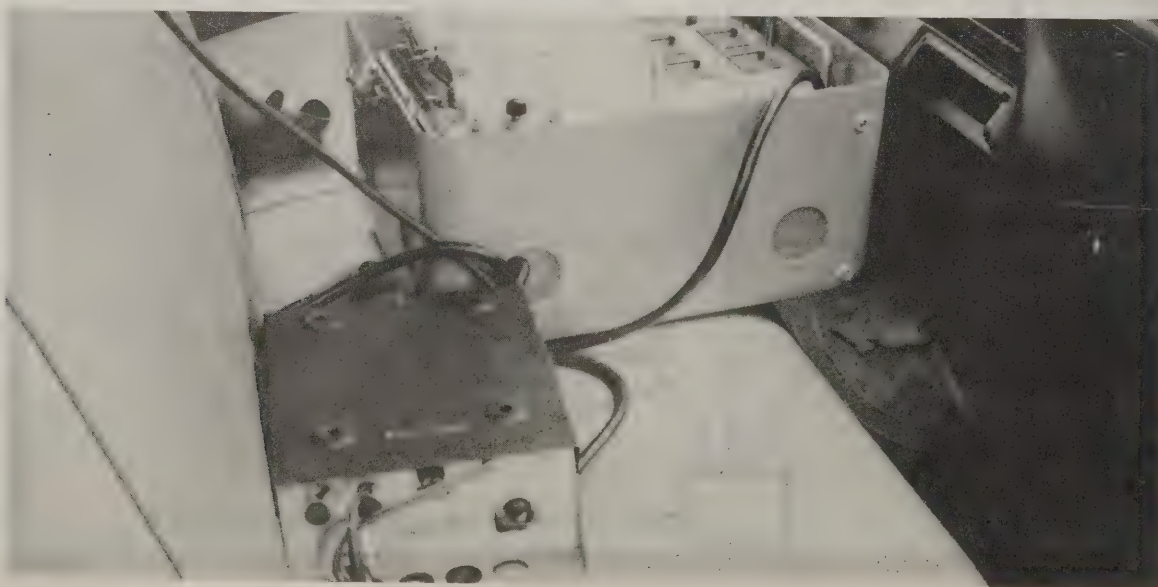


EACH TIME A VEHICLE CROSSES ONE OF THE 2 PNEUMATIC TUBES -- ACTING AS DETECTORS AND REFERENCE LINES -- A JUNIOR COUNTER SENDS AN ELECTRIC IMPULSE TO THE 20-PEN RECORDER WHICH REGISTERS IT ON A CHART, MAKING IT POSSIBLE TO MEASURE THE SPEEDS OF THE VEHICLES PASSING BETWEEN THE LINES.





TO RATE THE DEGREE OF SAFETY OF A BUSY ROAD, THIS DATA COMPILER, INSTALLED IN A CAR, RECORDS THE VEHICLE'S SPEED CHANGES PER UNIT OF TIME IN THE FLOW OF TRAFFIC.



BUREAU OF ELECTRONICS

& SCIENTIFIC AIDS

FOG ABATEMENT

THE EXPERIMENTAL OUTDOOR "FOG BROOM" INSTALLATION HAS BEEN IN OPERATION FOR OVER A YEAR. DURING THIS TIME SEVERAL HEAVY FOGS HAVE OCCURRED IN THE SURROUNDING AREA. AT THE FOG BROOM SITE THE FOG HAS NOT BEEN SERIOUSLY DENSE, INDICATING THAT THE FOG BROOM HAD A POSITIVE EFFECT. THIS EFFECTIVENESS IS ALSO SUPPORTED BY THE AUTOMATIC RECORDINGS OF FOG DENSITY, AS WELL AS VISUAL OBSERVATIONS.

THE DATA OBTAINED INDICATED THAT THE FOG-DENSITY MONITORS WERE IN NEED OF REDESIGN. THE PROPER ALIGNMENT OF THE AUTOMATIC SYSTEM WHICH CONTROLS THE POWER TO THE INSTALLATION HAS BEEN A CONSTANT PROBLEM. THIS ALIGNMENT DIFFICULTY IS BEING ELIMINATED BY THE DESIGN OF A BALANCING CIRCUIT AND A DIFFERENT SUPPORT SYSTEM.

TO FURTHER EVALUATE THE FOG BROOM PRINCIPLE AND TO TEST DIFFERENT PARAMETERS INVOLVED IN THE PHYSICAL LAYOUT OF THE INSTALLATION, AN ADDITIONAL TWENTY-BROOM SITE HAS BEEN DESIGNED FOR ROUTE 1 IN ELIZABETH, NEW JERSEY. THE EQUIPMENT HAS BEEN ORDERED. A SPECIAL ULTRAVIOLET DETECTION SYSTEM WILL BE USED TO DETECT THE FOG AND TO CONTROL THE EQUIPMENT.

THE ORIGINAL FOG CHAMBER AT THE AIRPORT, NORMALLY UTILIZED FOR DEMONSTRATIONS AND EVALUATION TESTS, WAS NOT IN OPERATION FOR SEVERAL MONTHS WHILE THE HEATING PADS WERE INSTALLED. A NEW PHOTO-ELECTRIC FOG DENSITY MEASURING SYSTEM WAS CONSTRUCTED, THE FOG BROOM MOTOR CONTROLLER WAS REWIRED, AND A GENERAL OVERHAULING AND WATERPROOFING OF THE FOG BROOM MOTORS TOOK PLACE. THE CHAMBER IS NOW IN OPERATION AND EXPERIMENTS ARE CONTINUING WITH ITS ARTIFICIAL FOG CONDITION.

THE PORTABLE FOG CHAMBER, BUILT TO DEMONSTRATE THE FOG BROOMS, WAS SUCCESSFULLY USED AT THE 1967 NEW JERSEY STATE FAIR. THE TWO-BROOM PORTABLE CHAMBER IS PRESENTLY STORED AT THE MERCER COUNTY AIRPORT.

STUDIES AND EVALUATION TESTS ARE BEING CONDUCTED TO DETERMINE THE EFFECTIVENESS AND FEASIBILITY OF INFRARED, POLARIZED LIGHT, LIGHT GIVEN UNIJUNCTION SOLID-STATE DEVICES, CLOSED-CIRCUIT TELEVISION, AND ANY PROMISING SYSTEM WHICH MIGHT INCREASE VISIBILITY IN FOG.

CONTINUED

EMERGENCY CALL SYSTEM

EMERGENCY CALL SYSTEMS THAT WILL PERMIT A DRIVER WITH A DISABLED VEHICLE OR NEEDING OTHER ASSISTANCE TO SUMMON AID FROM A NEARBY SERVICE AGENCY ARE BEING STUDIED AND EVALUATED. SUCH SYSTEMS ARE ESPECIALLY HELPFUL TO MOTORISTS ON THE INTERSTATE HIGHWAYS WHERE NO SERVICE AREAS EXIST WITHIN THE LIMITS OF THE RIGHT OF WAY.

A PROGRESS REPORT WAS ISSUED SUMMARIZING THE TESTS ON A MILE OF BURIED TWO-CONDUCTOR CABLE AND DESCRIBING A METHOD OF COMMUNICATION USING THE CHANGE OF POTENTIAL OF A SIMILAR CABLE AS IT SHORTED AT VARIOUS POINTS ALONG ITS LENGTH. APPROPRIATE COMMERCIAL INSTRUMENTS FOR AN INITIAL DEMONSTRATION AND EVALUATION OF SUCH A SYSTEM HAVE BEEN ORDERED.

A WORK ORDER REQUEST FOR INSTALLING APPROXIMATELY 15 MILES OF TWO-CONDUCTOR CABLE ALONG I-287 BETWEEN METUCHEN AND BOUND BROOK HAS BEEN ISSUED. THE NECESSARY CABLE IS AT HAND.

HOLOGRAPHY SIGNING

HOLOGRAPHY SIGNS USE THE PHENOMENON OF WAVE-FRONT RECONSTRUCTION OF LIGHT WAVES. AN IMAGE OF THE INTENDED SIGN IS TO BE PROJECTED OVER THE ROADWAY, WHILE THE ACTUAL PHYSICAL STRUCTURE WOULD REMAIN FAR FROM THE

ROAD. THE IMAGE IS TO BE FOCUSED INTO SPACE SO THERE WOULD BE NO SOLID SIGN FOR A DRIVER TO COLLIDE WITH IN THE EVENT THAT HE SHOULD LEAVE THE ROAD. HOLOGRAPHIC SIGNS COULD BE USED TO PROJECT IMAGINARY BARRIERS TO PREVENT WRONG-WAY DRIVERS FROM ENTERING RAMP. A PROTOTYPE MODEL OF A HOLOGRAPHIC TRAFFIC SIGN IS PRESENTLY BEING CONSTRUCTED; ONCE COMPLETED, IT WILL BE USED TO DETERMINE THE FEASIBILITY OF THE SYSTEM. RESEARCH IS CONTINUING INTO OPTICS AND POWER REQUIREMENTS.

MOBILE TELEVISION SURVEILLANCE

AS A MEANS OF ACCUMULATING TRUE RECORDS OF REPETITIOUS ACCIDENTS FOR SUBSEQUENT ANALYSIS, A MOBILE CLOSED-CIRCUIT TELEVISION SYSTEM WITH A VIDEO TAPE RECORDER IS BEING DEVELOPED. THE RECORDING OF THE BEHAVIOR PATTERNS OF TRAFFIC INCLUDING ACCIDENTS, AND THE ANALYSIS OF THESE PATTERNS MIGHT LEAD TO CORRECTIVE MEASURES FOR ELIMINATING THESE TYPES OF ACCIDENTS. MOST OF THE EQUIPMENT HAS BEEN OBTAINED, INCLUDING A PANEL TRUCK. IN CONJUNCTION WITH THE MOBILE SYSTEM, A REVIEW AND EDIT STUDIO HAS BEEN DESIGNED.

PAVEMENT HEATING

PLANS ARE BEING PREPARED FOR THE INSTALLATION AT FERNWOOD OF

A HEATED PAVEMENT SYSTEM UTILIZING PIPES CARRYING A HEATED FLUID AND ELECTRIC RESISTANCE WIRES. THE USE OF HEATED PAVEMENTS ELIMINATES ALL PROBLEMS ASSOCIATED WITH CONVENTIONAL SNOW AND ICE CONTROL TECHNIQUES, ESPECIALLY AT INTERCHANGES WHERE CHANNELIZATION AND STORAGE AREA LIMITATIONS MAKE SNOW PLOWING VERY DIFFICULT.

OF PRIMARY INTEREST WILL BE THE USE OF UNCONVENTIONAL HEAT SOURCES SUCH AS SOLAR ENERGY STORED IN THE EARTH BELOW THE PAVEMENT, NORMAL GROUND HEAT AND AIR HEAT, WHICH CAN BE EXTRACTED WITH A HEAT PUMP. ADDITIONAL EXPERIMENTS WILL BE CONDUCTED TO DETERMINE THE EFFECT OF THE SPACING, DIAMETER AND MATERIAL OF THE HEATING PIPES. THE TEST AREA WILL BE CONSTRUCTED OF BOTH BITUMINOUS CONCRETE AND PORTLAND CEMENT CONCRETE, INCLUDING THE USE OF THERMAL INSULATION BELOW ONE TEST AREA.

THE RESULTS OF THE TESTS WILL PROVIDE DESIGN DATA FOR FUTURE HEATED PAVEMENT INSTALLATIONS IN NEW JERSEY AND MAY REDUCE OPERATING COSTS DUE TO THE USE OF UNCONVENTIONAL HEAT SOURCES.

TRAFFIC FLOW SIMULATION

THE IMMEDIATE PURPOSE OF THIS PROJECT IS TO OBTAIN A REALISTIC REPRESENTATION OF TRAFFIC FLOW THROUGH SUCCESSIVE SIGNALS. THE ULTIMATE OBJECTIVE

IS TO CALCULATE THE TRAVEL TIME OF A SPECIFIC NUMBER OF CARS THROUGH A HIGHWAY SYSTEM IN BOTH DIRECTIONS AND TO ADJUST THE OFFSETS SO THAT A MINIMUM TRAVEL TIME IS OBTAINED IN BOTH DIRECTIONS. AT PRESENT, A PROGRAM IS BEING WRITTEN TO SIMULATE THE TRAFFIC FLOW. THE PRINCIPAL VARIABLES IN THE MATHEMATICAL FORMULATION OF THIS PROGRAM ARE THE SYNCHRONIZATION OF THE SIGNALS, THE TIMING OF THE SIGNALS, AND THE TRAVEL TIME BETWEEN SIGNALS.

AUDIO SIGNS AND RADIO DIRECTIONS

THESE TWO PROJECTS ARE COMBINED IN THE 1968 AND FUTURE WORK PROGRAMS. INVESTIGATIONS HAVE STARTED TO DEVISE AUDIBLE METHODS FOR INFORMING MOTORISTS OF HAZARDOUS LOCATIONS REQUIRING SPECIAL PRECAUTIONS AND TO ADVISE THEM OF DIRECTIONS TO ALTERNATE ROUTES. THESE SYSTEMS WOULD SUPPLEMENT THE STANDARD VISUAL SIGNS. A WIRE-CONDUCTED RADIO CARRIER SYSTEM HAS BEEN DEVELOPED WHICH MAY BE USED TO GIVE INFORMATION THAT MAY BE PICKED UP ON A CONVENTIONAL CAR RADIO AT DISCRETE AREAS ALONG THE HIGHWAY. NEGOTIATION WILL BE STARTED WITH COMMUNICATION EXPERTS TO CONSTRUCT A PROTOTYPE SYSTEM WITH THE OBJECTIVE IN VIEW OF CREATING AN OPERATIONAL INSTALLATION.

TALKING PAVEMENTS

BY EXPANDING ON THE "RUMBLE

STRIP" PRINCIPLE, IT MAY BE POSSIBLE TO CONTOUR THE CORRUGATIONS IN THE PAVEMENT IN SUCH A WAY THAT MEANINGFUL SOUNDS ARE GENERATED. INFORMATION MIGHT BE CONVEYED TO THE DRIVER, FOR EXAMPLE THE WORD "SLOW" WHERE SPEED REDUCTION IS NECESSARY. FOR THIS PURPOSE, SOUND CONTOURS ARE BEING STUDIED AND FIELD MEASUREMENTS OF SOUND FREQUENCIES OBTAINED ON RUMBLE STRIPS AND BRIDGE GRATINGS WILL BE MADE. WHEN THESE TESTS ARE COMPLETED, MODEL TALKING STRIPS WILL BE CONSTRUCTED ON PAVEMENTS AND EVALUATED BY THE USE OF A ONE-EIGHTH SCALED MODEL VEHICLE.

VEHICLE ENTRAPMENT

ERRANT VEHICLES, RUNNING OFF THE ROAD AND STRIKING RELATIVELY IMMOVABLE OBJECTS, ACCOUNT FOR A LARGE PROPORTION OF THE HIGHWAY DEATHS EACH YEAR. STUDIES AND TESTS WILL BE MADE WITH SAND, GRAVEL AND OTHER LOOSE MATERIALS TO CREATE AN ENTRAPMENT AREA, WHERE SUCH VEHICLES CAN BE CONTAINED AND STOPPED WITHOUT SERIOUS INJURY TO THE OCCUPANTS. FULL-SCALE TESTS WILL BE CONDUCTED AT MERCER COUNTY AIRPORT, USING OBSOLETE VEHICLES. VARIOUS CONFIGURATIONS OF THE MATERIALS WILL ALSO BE USED AND THE FINAL RESULTS WILL BE COMPARED TO OTHER ENERGY ABSORPTION ARRESTING DEVICES FROM BOTH EFFECTIVENESS AND ECONOMY ASPECTS.

PAVEMENT MARKING AND VEHICLE DETECTION

STUDIES ARE UNDER WAY TO EVALUATE PAVEMENT MARKINGS, SUCH AS COLORED TRAFFIC MARKINGS AND PAINTED ARROWHEADS ON TRAFFIC LANE LINES, IN ORDER TO IMPROVE TRAFFIC BEHAVIOR. INVESTIGATIONS INTO MARKINGS FOR DIRECTION INFORMATION WILL BE CONTINUED. THESE MARKINGS WILL AUGMENT THE CUSTOMARY TRAFFIC SIGNS.

DRIVERS TRAVELING IN THE WRONG DIRECTION HAVE ALWAYS BEEN A SOURCE OF ACCIDENTS. RESEARCH HAS BEGUN INTO THEIR CAUSE AS WELL AS THEIR PREVENTION. A MAGNETIC SYSTEM, A PHOTO-ELECTRIC SYSTEM AND AN OSCILLATOR SYSTEM HAVE BEEN DESIGNED TO DETECT AND WARN THE WRONG-WAY DRIVER. THESE SYSTEMS CAN BE COMPLEMENTED BY PAVEMENT MARKINGS.

DISABLED CARS ON THE SHOULDER OF A HIGHWAY ARE EXPOSED TO REAR-END COLLISIONS. THE FEASIBILITY OF SEVERAL SYSTEMS THAT WOULD DETECT STRANDED VEHICLES IS BEING EVALUATED. ONCE A STRANDED VEHICLE HAS BEEN DETECTED, THE NECESSARY HELP CAN BE QUICKLY DISPATCHED.

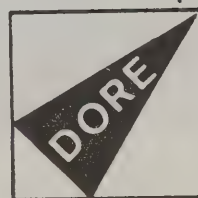
VEHICLE EXHAUST POLLUTION

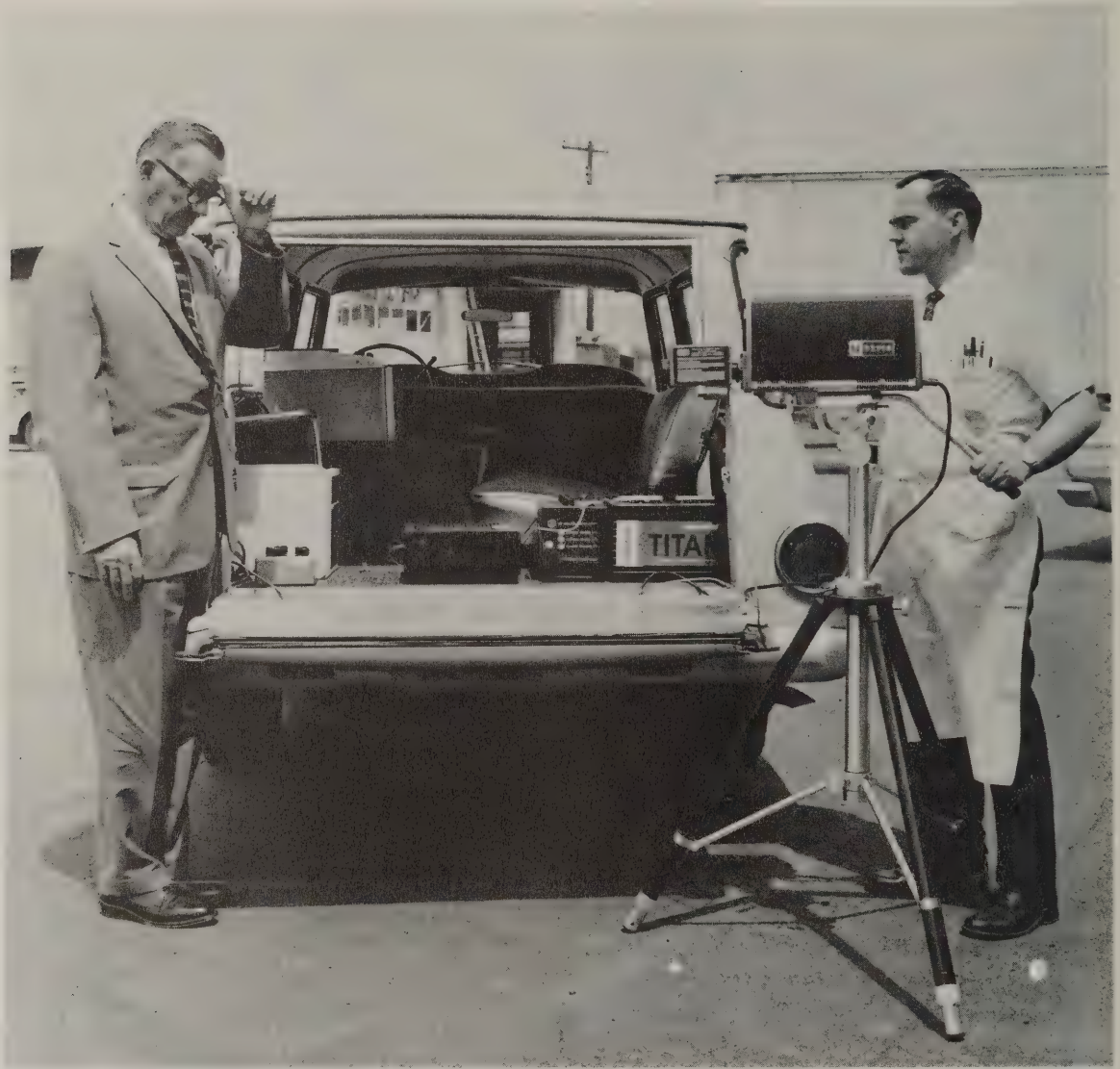
PRELIMINARY WORK IS CONTINUING INTO A SEARCH FOR THE BEST METHOD TO ELIMINATE THE NITROGEN OXIDES, WHICH HAVE BEEN INDICATED AS THE PRIMARY CAUSE OF AIR POLLUTION FROM VEHICULAR EXHAUST.

THE BUREAU HAS RECEIVED TESTING EQUIPMENT TO CARRY OUT A TOTAL-SCOPE STUDY OF POLLUTION CONTROL FROM VEHICLE EXHAUSTS. M.W. KELLOGG RESEARCH DIVISION IS BEING CONTRACTED TO INVESTIGATE THE ELIMINATION OR REDUCTION OF OXIDES OF NITROGEN IN AUTOMOBILE EXHAUSTS. VARIOUS EXHAUST CONTROL DEVICES WILL BE BUILT AND EVALUATED ON TEST VEHICLES. THE END OBJECTIVE WILL BE THE ENGINEERING OF AN OPERATIONAL POLLUTION CONTROL SYSTEM FOR VEHICLE EXHAUSTS.

NOISE MEASUREMENTS

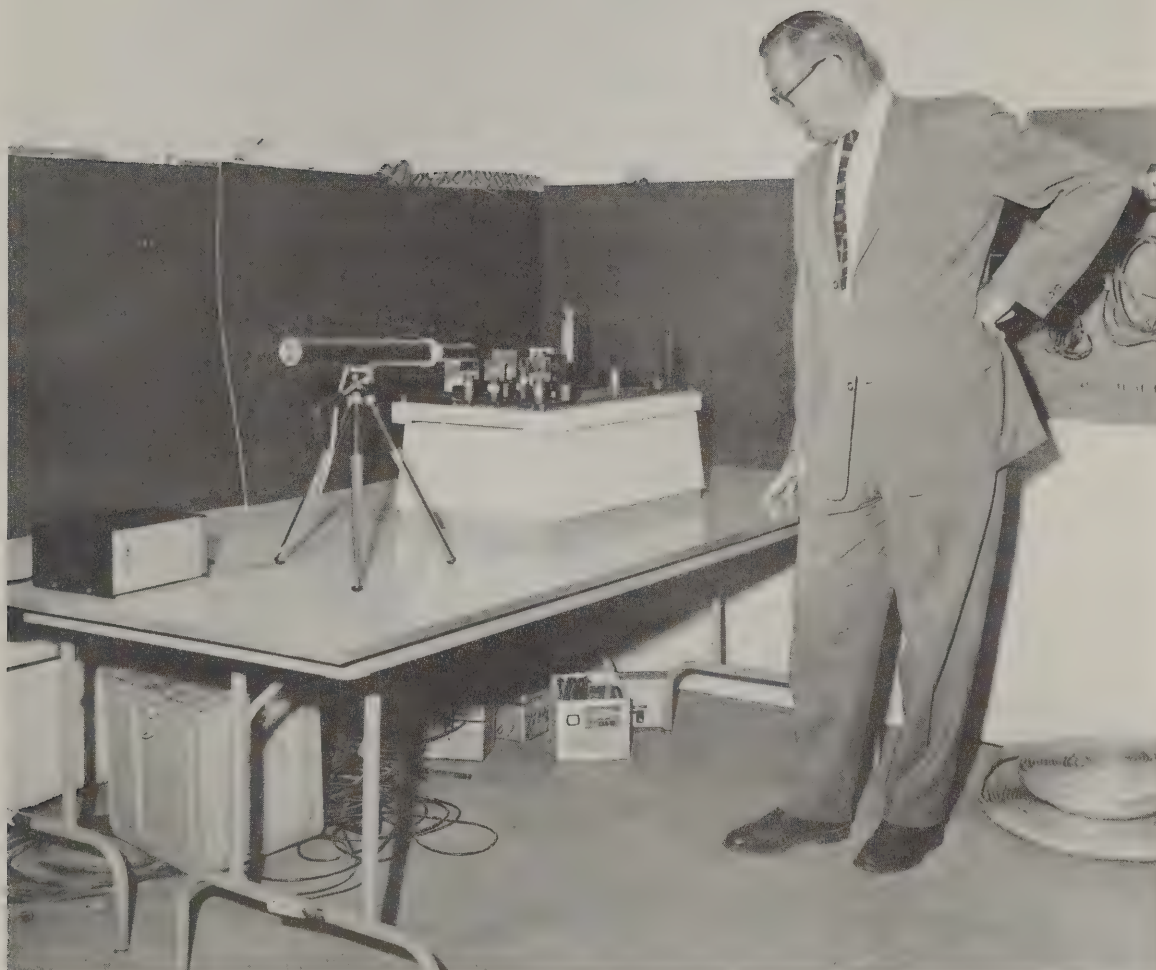
DATA ARE BEING OBTAINED ON HIGHWAY NOISE LEVELS TO PROTECT THE STATE IN CASE OF EVENTUAL LAW SUITS BECAUSE OF ALLEGED DAMAGES DUE TO POSSIBLE INCREASED NOISE LEVELS AFTER COMPLETION OF NEW HIGHWAYS. THE OCCASION FOR THIS STUDY WILL BE THE NEW SECTION OF INTERSTATE 287 NEAR GEORGE WASHINGTON SCHOOL IN MORRISTOWN. PRIOR TO THE START OF CONSTRUCTION, NOISE LEVEL MEASUREMENTS WERE MADE WHEN THE SCHOOL WAS IN SESSION. BOLT, BERANEK, AND NEWMAN, ACOUSTICS EXPERTS, HAVE BEEN CONTRACTED TO CARRY OUT THIS ASSIGNMENT.





THIS TELEVISION CAMERA WITH ACCESSORIES IS PART OF A CLOSED-CIRCUIT TV SYSTEM UNDER DEVELOPMENT AT DORE'S MERCER AIRPORT LABORATORIES.

IT WILL PERMIT THE ACCUMULATION OF TRUE RECORDS OF REPETITIOUS ACCIDENTS AND THEIR ANALYSIS, WITH CORRECTIVE MEASURES IN VIEW FOR ELIMINATING THESE TYPES OF ACCIDENTS.



THE DEPARTMENT'S LAZER GUN WILL BE THE SOURCE OF MONOCHROMATIC LIGHT BEAMS, IN TESTS UNDER PREPARATION THAT ARE EXPECTED TO LEAD TO THE PROJECTION OF IMPALPABLE HOLOGRAPHIC IMAGES OF SIGNS.

THESE IMAGES, FOCUSED INTO SPACE BY THE ROADSIDE, WOULD TAKE THE PLACE OF REAL SIGNS, THUS ELIMINATING A TYPE OF OBSTACLE THAT HAS BEEN A FREQUENT CAUSE OF ACCIDENTS.

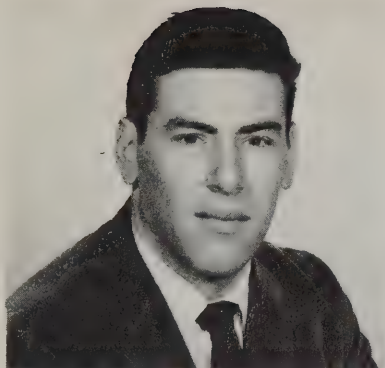
END-THOUGHT

THE DAY WILL YET COME
WHEN POSTERITY WILL BE AMAZED
THAT WE REMAINED IGNORANT OF THINGS
WHICH TO THEM WILL SEEM SO PLAIN

(Seneca)



**BIOGRAPHIES
OF PROFESSIONAL PERSONNEL**



KENNETH C. AFFERTON

MR. AFFERTON JOINED THE TRANSPORTATION DEPARTMENT IN JUNE 1963 ENTERING ITS TRAINING PROGRAM FOR ASSISTANT ENGINEERS. LATER IN THAT YEAR

HE WAS GRANTED A LEAVE OF ABSENCE TO PERFORM GRADUATE WORK IN SOIL MECHANICS AND STRUCTURES. FOLLOWING THE SUCCESSFUL COMPLETION OF HIS GRADUATE DUTIES HE REJOINED THE DEPARTMENT TAKING THE POSITION OF RESEARCH ENGINEER WITH THE DIVISION OF RESEARCH AND EVALUATION.

MR. AFFERTON'S WORK ACTIVITIES HAVE INCLUDED THE PLANNING AND DIRECTING OF FOUNDATION INVESTIGATIONS FOR VARIOUS PAVEMENT AND BRIDGE DISTRESS STUDIES, THE PREPARATION OF REPORTS ON RESEARCH PROJECTS FOR THE STATE HIGHWAY ENGINEER AND THE BUREAU OF PUBLIC ROADS, THE SUPERVISING OF THE TRANSPORTATION DEPARTMENT'S QUALITY CONTROL RESEARCH PROJECT, AND REPRESENTING THE DEPARTMENT AT VARIOUS CONFERENCES ON ASPHALT PAVING TECHNOLOGY AND STATISTICAL QUALITY CONTROL OF HIGHWAY CONSTRUCTION.

MR. AFFERTON RECEIVED HIS BACHELOR OF CIVIL ENGINEERING DEGREE FROM COOPER UNION SCHOOL OF ENGINEERING IN 1963 AND A MASTER OF SCIENCE DEGREE FROM NORTHWESTERN UNIVERSITY IN 1965. HE IS PRESENTLY AN ASSOCIATE MEMBER OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS, AND HAS SERVED AS A VISITING LECTURER IN STATISTICAL APPLICATIONS TO HIGHWAYS AT RUTGERS UNIVERSITY. HIS RESEARCH PAPER "A STATISTICAL STUDY OF ASPHALTIC CONCRETE" HAS BEEN PUBLISHED BY THE HIGHWAY RESEARCH BOARD AND APPEARS IN HIGHWAY RESEARCH RECORD 184 - QUALITY CONTROL.



DAVID APPLEGATE

MR. APPLEGATE JOINED THE DIVISION OF RESEARCH AND EVALUATION IN JUNE 1967 COMING FROM THE SOIL CONSERVATION SERVICE, U.S.D.A. HE IS PRESENTLY SERVING AS AN ASSISTANT ENGINEER WITH THE BUREAU OF STRUCTURES AND MATERIALS.

HIS MAJOR WORK TO DATE HAS BEEN IN RELATION TO HIGHWAY CONSTRUCTION PRACTICES AND STREAM SEDIMENTATION AND STREAM FLOW RATES.

MR. APPLEGATE DID UNDERGRADUATE WORK AT TRENTON JUNIOR COLLEGE WHERE HE RECEIVED AN A.S. DEGREE AND UTAH STATE UNIVERSITY IN LOGAN, UTAH WHERE HE RECEIVED HIS B.S. DEGREE FROM THE SCHOOL OF FORESTRY.



ROBERT F. BAKER

AFTER GRADUATING FROM SOUTH HUNTERDON REGIONAL HIGH SCHOOL, MR. BAKER ATTENDED TRENTON JUNIOR COLLEGE UNTIL GRADUATION IN JUNE 1966.

HE BEGAN WORK AS AN ENGINEERING TECHNICIAN WITH H. K. PORTER IN THEIR FRICTION MATERIALS LABORATORY. AFTER BEING EMPLOYED BY THE DODCO SPACE RESEARCH CENTER AND TENNECO PLASTICS MANUFACTURING COMPANY AS A RESEARCH TECHNICIAN AND ENGINEERING TECHNICIAN, RESPECTIVELY, MR. BAKER BEGAN HIS CAREER WITH THE DIVISION OF RESEARCH AND EVALUATION IN MAY 1966. SINCE THEN, HE HAS WORKED WITH THE BUREAU OF STRUCTURES AND MATERIALS IN THE FIELD SURVEY CREW AND ASSISTED IN THE WRITING OF TWO REPORTS: "METALLIC BRIDGE DECK EVALUATION" AND "PORTLAND CEMENT CONCRETE PAVEMENT DAMAGE." HE WAS ALSO RESPONSIBLE FOR WRITING THE REPORT, "CHAIN LINK FENCE EVALUATION."



WILLIAM T. BAKER

BEFORE JOINING THE NEW JERSEY STATE HIGHWAY DEPARTMENT IN DECEMBER 1965 AS A RESEARCH ENGINEER IN THE BUREAU OF SAFETY AND TRAFFIC, MR. BAKER WAS EMPLOYED BY THE U. S. BUREAU OF PUBLIC ROADS, OFFICE OF HIGHWAY SAFETY, FOR TWO YEARS. AS A HIGHWAY ENGINEER, HIS

DUTIES INCLUDED ASSISTING THE COORDINATOR OF THE FEDERAL SPOT IMPROVEMENT PROGRAM, STAFF ENGINEER ON A COOPERATIVE ACCIDENT RECORDS PROJECT WITH THE STATES, AND RELATED HIGHWAY SAFETY WORK WHERE THE FEDERAL-STATE RELATIONSHIP EXISTS.

MR. BAKER'S EARLIER EXPERIENCE INCLUDES LAND SURVEYING, HIGHWAY SURVEYING, AND PRELIMINARY HIGHWAY ENGINEERING WITH THE CONSULTING FIRM OF MICHAEL BAKER, JR. & ASSOCIATES, DOING WORK ON THE FEDERAL INTERSTATE SYSTEM.

MR. BAKER IS A GRADUATE OF YOUNGSTOWN UNIVERSITY (B.S.C.E. 1962). HE RECEIVED A MASTERS DEGREE IN CIVIL ENGINEERING FROM THE UNIVERSITY OF WASHINGTON IN 1964 WHERE HE WAS EMPLOYED AS A RESEARCH ASSISTANT.

MR. BAKER IS CURRENTLY A JUNIOR MEMBER OF THE INSTITUTE OF TRAFFIC ENGINEERS, SERVING ON THREE TRAFFIC OPERATIONS COMMITTEES. HE ALSO IS A MEMBER OF THE HIGHWAY RESEARCH BOARD'S COMMITTEES ON TRAFFIC SAFETY AND VEHICLE CHARACTERISTICS.

MR. BAKER IS THE AUTHOR OF THE FOLLOWING PUBLICATIONS:
"AUTOMATING TRAFFIC ACCIDENT RECORDS," TREND IN ENGINEERING, SEATTLE, WASHINGTON, UNIVERSITY OF WASHINGTON, APRIL 1964; "THE NEW JERSEY MILEPOST SYSTEM," TRAFFIC ENGINEERING, JUNE 1967.



WESLEY R. BELLIS

BEFORE JOINING THE NEW JERSEY DEPARTMENT OF TRANSPORTATION, MR. BELLIS WORKED FOR A SHORT TIME WITH THE CONCRETE STEEL COMPANY IN NEW YORK CITY AND WITH THE PORT OF NEW YORK AUTHORITY. WITH THE PORT OF NEW YORK AUTHORITY, HE WAS ASSIGNED TO THE LOCATION

SURVEYS FOR THE GOETHALS BRIDGE BETWEEN BAYONNE, NEW JERSEY AND PORT RICHMOND, STATEN ISLAND, NEW YORK CITY.

HE STARTED WORK WITH THE NEW JERSEY TRANSPORTATION DEPARTMENT IN MARCH OF 1927 AS A JUNIOR ENGINEER, WHERE HE HAS WORKED CONTINUALLY PROGRESSING TO THE POSITION OF DIRECTOR OF THE DIVISION OF RESEARCH AND EVALUATION. DURING WORLD WAR II, HE SERVED WITH THE ARMED SERVICE FORCES AS A HIGHWAY TRAFFIC ENGINEER, WITH AN ASSIMILATED RANK OF LIEUTENANT COLONEL, IN THE FRENCH AND GERMAN COMBAT AREAS FOR NINE MONTHS, WHILE ON LEAVE FROM THE HIGHWAY DEPARTMENT. HE HAS BEEN INSTRUMENTAL IN THE DESIGN OF NUMEROUS UNIQUE CHANNELIZED INTERSECTIONS AND HAS PLAYED AN IMPORTANT PART IN MANY OF THE ACHIEVEMENTS FOR WHICH THE NEW JERSEY STATE HIGHWAY DEPARTMENT IS JUSTLY NOTED THROUGHOUT THE WORLD. HE WAS A MAJOR FACTOR IN THE SELECTION OF THE ALIGNMENT LOCATION FOR THE NEW JERSEY TURNPIKE (THEN ROUTES 100 AND 300) AND FOR THE GARDEN STATE PARKWAY (THEN ROUTE 4). HE ALSO WAS RESPONSIBLE FOR TRAFFIC VOLUME ESTIMATES USED IN THE DESIGN OF THESE ROADS.

MR. BELLIS GRADUATED FROM RUTGERS UNIVERSITY IN 1926 WITH A B.S. DEGREE IN CIVIL ENGINEERING. HE IS LISTED IN MARQUI'S WHO'S WHO IN THE EAST. HE IS A MEMBER OF THE INSTITUTE OF TRAFFIC ENGINEERS AND OF THE ENGINEERS CLUB OF TRENTON AND IS A LICENSED PROFESSIONAL ENGINEER IN NEW JERSEY. HE HAS SERVED AS THE CHAIRMAN OF A COMMITTEE ON MEDIANS IN THE INSTITUTE OF TRAFFIC ENGINEERS. HE HAS SERVED ON THE COMMITTEE ON TRAFFIC FOR THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, AND WITH THE HIGHWAY RESEARCH BOARD HAS SERVED ON THE COMMITTEES OF HIGHWAY CAPACITY, CHANNELIZATION AND OPERATIONAL EFFECTS OF GEOMETRICS.

CONTINUED----

WESLEY R. BELLIS (Cont'd)

HE SERVED ON THE FACULTY OF COLUMBIA UNIVERSITY OF NEW YORK CITY AS A LECTURER IN TRAFFIC ENGINEERING FOR SIX YEARS, AND HAS LECTURED AT RUTGERS AND OTHER SCHOOLS.

HE IS THE AUTHOR OF THE FOLLOWING PUBLISHED ARTICLES:

1. "TRAFFIC REPORT, BEFORE AND AFTER IMPROVEMENT OF THE INTERSECTION OF ROUTE 1 AND 25," PUBLISHED IN THE PROCEEDINGS OF THE 30TH ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD, 1951.
2. "SELECTING INTERSECTION TYPES BY TRAFFIC VOLUME", PUBLISHED IN THE JANUARY 1951 TRAFFIC QUARTERLY.
3. "COST OF TRAFFIC INEFFICIENCIES", PUBLISHED IN TRAFFIC ENGINEERING NOVEMBER 1952.
4. "HIGHWAY PROGRESS", PUBLISHED IN THE INTERNATIONAL ROAD SAFETY AND TRAFFIC REVIEW FOR SPRING 1953.
5. "DIRECTIONAL CHANNELIZATION DESIGN", HIGHWAY RESEARCH BOARD BULLETIN 72, 1953.
6. "SHOULDER USE", HIGHWAY RESEARCH BOARD BULLETIN 170, 1958.
7. "INCREASING CITY STREET CAPACITY", TRAFFIC QUARTERLY, JANUARY 1959.
8. "CAPACITY OF TRAFFIC SIGNALS AND TRAFFIC SIGNAL TIMING", HIGHWAY RESEARCH BOARD BULLETIN 274, 1960.
9. "30TH PEAK HOUR TRENDS", HIGHWAY RESEARCH BOARD RECORD 27 IN 1963.
10. "INTERSECTION DESIGN SWITCH POINT", HIGHWAY RESEARCH BOARD RECORD 105, 1966.
11. "HIGHWAY CAPACITY MANUAL", WITH OTHER COMMITTEE MEMBERS OF THE HIGHWAY RESEARCH BOARD - BOTH THE ORIGINAL MANUAL IN 1950 AND THE NEW MANUAL OF 1965.
12. "CHANNELIZATION FOR HIGHWAY INTERSECTIONS AT GRADE", WITH OTHER COMMITTEE MEMBERS - BOTH FOR THE ORIGINAL HIGHWAY RESEARCH BOARD REPORT IN 1950 AND THE REPORT IN 1962.



DR. RICHARD E. BORUP, Ph.D.

DR. BORUP OBTAINED HIS B.S. DEGREE FROM THE UNIVERSITY OF MINNESOTA IN 1937. AFTER TEACHING HIGH SCHOOL CHEMISTRY, PHYSICS, AND MATHEMATICS FOR TWO YEARS, HE ATTENDED THE UNIVERSITY OF MICHIGAN WHERE HE RECEIVED HIS M.S. DEGREE IN 1940. HE EARNED HIS DOCTORATE AT NEW YORK UNIVERSITY IN 1951. HE PERFORMED POST-DOCTORAL RESEARCH AT BALLIOL COLLEGE, OXFORD UNIVERSITY, OXFORD, ENGLAND AND HAS TRAVELED EXTENSIVELY THROUGHOUT ALL OF THE FREE COUNTRIES OF WESTERN EUROPE.

HIS INDUSTRIAL EXPERIENCE COVERS ABOUT 20 YEARS IN THE FIELD OF PETROLEUM, WHICH INCLUDES EXPLORATION AND PRODUCTION, REFINERY OPERATIONS, LABORATORY CONTROL, AND RESEARCH AND DEVELOPMENT AT THE LOWER AND MIDDLE MANAGEMENT LEVELS. HE HAS PUBLISHED SEVERAL TECHNICAL PAPERS AND HAS SHARED IN SEVERAL PATENTS WHICH HAVE BEEN ISSUED TO PREVIOUS EMPLOYERS.

HE IS A VETERAN OF WORLD WAR II, HAVING SERVED WITH THE U. S. NAVY IN BOTH THE ATLANTIC AND PACIFIC THEATRES OF OPERATION. HE HOLDS THE RANK OF COMMANDER AND IS CURRENTLY ACTIVE IN THE RESEARCH RESERVE PROGRAM UNDER COGNIZANCE OF THE OFFICE OF NAVAL RESEARCH.

HE HAS BEEN A MEMBER OF THE AMERICAN CHEMICAL SOCIETY, AMERICAN ASSOCIATION OF THE ADVANCEMENT OF SCIENCE, THE AMERICAN PETROLEUM INSTITUTE, AMERICAN SOCIETY OF TESTING AND MATERIALS, THE INSTITUTE OF RADIO ENGINEERS, AND IS A FELLOW OF THE AMERICAN INSTITUTE OF CHEMISTS. HE HOLDS SCHOLASTIC AND ACADEMIC HONORS INCLUDING PHI LAMBDA Upsilon AND THE SOCIETY OF SIGMA XI. HE IS A REGISTERED PROFESSIONAL ENGINEER OF THE STATE OF NEW JERSEY; A MEMBER OF NCHRP PANEL G 70 TRAFFIC, SECTION 5, ILLUMINATION AND VISIBILITY; AND A MEMBER OF HRB COMMITTEE T06 ON HIGHWAY SAFETY.

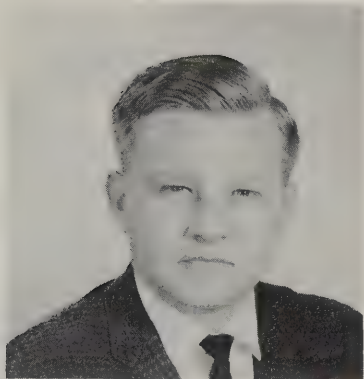
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DR. RICHARD E. BORUP, Ph.D. (Cont'd)

DR. BORUP CAME WITH THE NEW JERSEY STATE HIGHWAY DEPARTMENT AS SUPERVISING ENGINEER OF THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS IN THE DIVISION OF RESEARCH AND EVALUATION IN JUNE OF 1965 AFTER SERVING A YEAR WITH THE STATE OF ALASKA HIGHWAY DEPARTMENT, DURING WHICH TIME HE ALSO TAUGHT AT THE UNIVERSITY OF ALASKA.

PUBLICATIONS AND PATENTS

1. "POLAROGRAPHIC DETERMINATION OF TETRACHTYL LEAD IN GASOLINE" PROC. A.S.T.M., Vol. 47, 1947.
A PATENT COVERING A PORTION OF THE APPARATUS DEVELOPED FOR USE IN THIS PROCEDURE WAS ISSUED TO THE TEXAS COMPANY (TEXAS).
2. "GRAVIMETRIC DETERMINATION OF ZINC UTILIZING THE RADIOISOTOPE ZN" ANALYTICAL CHEMISTRY Vol. 25, 1953.
PH.D. THESIS - IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY AT NEW YORK UNIVERSITY, GRANTED IN JUNE 1951.
3. "CONDUCTOMETRIC DETERMINATION OF SALT IN CRUDE OILS."
PRESENTED AT THE 28TH MIDYEAR MEETING OF AMERICAN PETROLEUM INSTITUTE'S DIVISION OF REFINING, BENJAMIN FRANKLIN HOTEL, PHILADELPHIA, PENNSYLVANIA, MAY 15, 1963 AND PUBLISHED BY THE AMERICAN PETROLEUM INSTITUTE.
A PATENT COVERING THE PETROLEUM REFINERY PROCESS VERSION OF THE INSTRUMENT DEVELOPED FOR THIS PROCEDURE WAS ISSUED TO THE CITIES SERVICE COMPANY.
4. "X-RAY SPECTROGRAPHIC PROCEDURE FOR THE DETERMINATION OF CALCIUM, BARIUM, ZINC AND LEAD IN HYDROCARBON" ANALYTICAL CHEMISTRY Vol. 36, 1964.



KARL BRODTMAN

MR. BRODTMAN JOINED THE DIVISION OF RESEARCH AND EVALUATION IN APRIL 1968 AND IS PRESENTLY SERVING AS SENIOR ENGINEER WITH THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS. HE IS ENGAGED IN THE MOBILE T.V. SURVEILLANCE AND FOG

BROOM PROJECTS.

MR. BRODTMAN DID UNDERGRADUATE WORK AT FRANCIS T. NICHOLLS STATE COLLEGE AND RECEIVED HIS B.S. DEGREE IN PHYSICS FROM LOUISIANA STATE UNIVERSITY IN AUGUST 1960.

HE JOINED THE ASTRO-ELECTRONICS DIVISION OF R.C.A. IN 1960 AS A MEMBER OF THE ATTITUDE CONTROL GROUP, WHERE HE PARTICIPATED IN THE DEVELOPMENT OF AN ATTITUDE CONTROL JET AND ANALYZED TIROS I SPIN AXIS PRECESSION. IN 1961 HE TRANSFERRED TO THE SPACE POWER DEPARTMENT. DURING THE NEXT SEVEN YEARS, MR. BRODTMAN DID THE ANALYSIS, DEVELOPMENT AND DESIGN ON THE SOLAR CELL POWER SUPPLIES FOR TIROS, RELAY, NIMBUS, LUNAR ORBITER, MANNED ORBITAL POWER SUPPLY AND CLASSIFIED SATELLITES. HE HAS WRITTEN NUMEROUS PROPOSALS AND SPECIFICATIONS FOR SATELLITE POWER SUPPLIES AND HAS SUBMITTED TWO PROPOSALS FOR SATELLITE EXPERIMENTS.

DURING A SIX MONTHS RESIDENCE AT LAB 3 OF THE R.C.A. LABS, HE DEVELOPED A COMPUTER PROGRAM FOR THE INTEGRATION OF VAN ALLEN BELT ELECTRONS AND PROTONS INTERCEPTED BY A SATELLITE IN ANY EARTH ORBIT AND FABRICATED THIN FILM GALLIUM ARSENIDE SOLAR CELLS.

HE HAS TAKEN GRADUATE LEVEL COURSES AT THE UNIVERSITY OF PENNSYLVANIA, TEMPLE UNIVERSITY, RUTGERS UNIVERSITY AND AT R.C.A.



IRWIN CHODASH

MR. CHODASH BEGAN HIS PROFESSIONAL CAREER WITH THE NEW JERSEY STATE HIGHWAY DEPARTMENT AS AN ASSISTANT ENGINEER IN THE BUREAU OF SAFETY AND TRAFFIC IN JANUARY 1965. HIS DUTIES ARE VARIED AND INCLUDE THE FOLLOWING: ANALYSIS OF SIGNALIZED INTERSECTIONS; ACCIDENT VOLUME RELATIONSHIP ON ROUTE 22; AND A STUDY OF THE SOCIAL AND ECONOMIC EFFECTS OF THE VERRAZANO-NARROWS BRIDGE IN NEW JERSEY.

MR. CHODASH, IN RECENT MONTHS, HAS BEEN DOING WORK IN THE FIELD OF TRANSPORTATION PLANNING WITH THE COOPERATION OF THE DIVISION OF PLANNING (NJDT) AND THE PENN JERSEY TRANSPORTATION STUDY. SPECIFICALLY, HE HAS DEVELOPED MULTIPLE REGRESSION EQUATIONS TO DETERMINE TRIP GENERATION IN RURAL AREAS. HOPEFULLY, THESE EQUATIONS WILL BE USED STATEWIDE TO PREDICT TRIP PRODUCTIONS AND ATTRACTIONS IN RURAL AREAS. PRESENTLY, WITH THE COOPERATION OF THE DIVISION OF PLANNING, HE IS USING VARIOUS MODELS TO PREDICT THE DWELLING UNIT GROWTH FOR THE ATLANTIC CITY REGION.

MR. CHODASH IS A GRADUATE OF THE CITY COLLEGE OF NEW YORK (1964) WITH A B.S. DEGREE IN METEOROLOGY, AND IS A MEMBER OF THE AMERICAN METEOROLOGICAL SOCIETY.

HE IS NOW ATTENDING THE POLYTECHNIC INSTITUTE OF BROOKLYN IN A PROGRAM WHICH WILL EVENTUALLY LEAD TO A MASTERS DEGREE IN URBAN TRANSPORTATION AND PLANNING AND PLANS TO GRADUATE IN JUNE OF 1969.



R. BRUCE COSABOOM

MR. COSABOOM JOINED THE TRANSPORTATION DEPARTMENT IN JUNE 1967, AS AN ASSISTANT ENGINEER. IN SEPTEMBER 1967, HE WAS GRANTED A LEAVE OF ABSENCE TO PERFORM GRADUATE WORK IN STRUCTURES WITH A MAJOR IN REINFORCED CONCRETE. IN MAY 1968 HE RESUMED FULL-TIME WORK WITH THE DEPARTMENT IN THE DIVISION OF RESEARCH AND EVALUATION.

MR. COSABOOM RECEIVED HIS BACHELOR OF SCIENCE DEGREE IN CIVIL ENGINEERING FROM RUTGERS, THE STATE UNIVERSITY, IN 1967. HE IS CURRENTLY PERFORMING RESEARCH AT RUTGERS IN CRACK DISTRIBUTION IN POST-TENSIONED CONCRETE BEAMS FOR HIS MASTER'S THESIS. THE RESULTS OF HIS RESEARCH WILL BE SUBMITTED TO THE AMERICAN CONCRETE INSTITUTE FOR THE PURPOSE OF FUTURE MODIFICATION AND COMPLETION OF THE A.C.I. BUILDING CODE IN THE AREA OF PRE-STRESSED CONCRETE.

MR. COSABOOM IS A MEMBER OF THE AMERICAN CONCRETE INSTITUTE AND THE AMERICAN SOCIETY OF CIVIL ENGINEERS.



JACK R. CROTEAU

MR. CROTEAU ATTENDED LEHIGH UNIVERSITY
WHERE HE RECEIVED B.A. AND B.S.C.E.
DEGREES. HE ALSO HOLDS A M.S.C.E.

DEGREE FROM DREXEL INSTITUTE OF TECHNOLOGY.

PRIOR TO COMING TO THE DIVISION OF RESEARCH IN MAY 1967,
MR. CROTEAU WORKED FOR THREE YEARS FOR THE BUREAU OF MAINTENANCE.

MR. CROTEAU RECEIVED THE ENGINEER-IN-TRAINING CERTIFICATE
FROM THE STATE OF PENNSYLVANIA.



JOHN T. DEMPSTER, JR.

MR. DEMPSTER FIRST JOINED THE DIVISION IN AUGUST 1964 IN A TEMPORARY ADMINISTRATIVE TITLE; IN JANUARY 1967 HE WAS APPOINTED AN ASSISTANT ENGINEER AND IS SERVING AS THE ADMINISTRATIVE ASSISTANT TO THE DIRECTOR OF RESEARCH, TRANSPORTATION.

MR. DEMPSTER IS A RETIRED NAVY LIEUTENANT COMMANDER HAVING SERVED IN VARIOUS DUTY STATIONS BETWEEN JANUARY 1937, WHEN HE FIRST ENLISTED, TO JUNE 1964 WHEN HE RETIRED.

MR. DEMPSTER COMPLETED FIVE TERMS OF STUDY AT MIAMI UNIVERSITY, OXFORD, OHIO AND 40 WEEKS AT THE NAVY GENERAL LINE SCHOOL, MONTEREY, CALIFORNIA, AS WELL AS OTHER SHORTER COURSES.



ROGER Ferval

AFTER HIS ENGINEERING STUDIES AT LAUSANNE, HIS CAREER STARTED IN THE FRENCH STEEL INDUSTRY, WHICH SENT HIM TO THIS COUNTRY IN 1927. AT THE END OF TWO YEARS IN NEW YORK AS THE DELEGATE OF THE DE WENDEL MILLS, HE SWITCHED TO AMERICAN BUSINESS.

JOHNS-MANVILLE MOVED HIM BACK TO PARIS AS REPRESENTATIVE AND SALES ENGINEER TO TRAVEL IN EUROPE, INVOLVING HIM IN MANY TECHNOLOGIES. HIS COUNTRY'S DISASTER AND THE OCCUPATION OF PARIS EARLY IN THE SECOND WORLD WAR FORCED HIM SOUTHWARD INTO THE SO-CALLED FREE ZONE. THERE HE TAUGHT ENGLISH UNTIL FINALLY SECURING THE EXIT VISA - JUST BEFORE THE ALLIED LANDINGS IN NORTH AFRICA AND HITLER'S TAKE-OVER OF SOUTHERN FRANCE. IN HOSPITABLE PORTUGAL HE WORKED AS CONSULTING ENGINEER ON ARCHITECTURAL ACOUSTICS, INCLUDING RESEARCH.

THE WAR'S END BROUGHT HIM BACK TO NEW YORK AND HIS OLD COMPANY, FROM WHICH HE RESIGNED IN 1957. HE HAD BECOME AN AMERICAN CITIZEN IN 1952. SEVERAL EXPLORATORY JOBS LED TO THE MANAGING EDITORSHIP OF THE TECHNICAL MAGAZINE IAMI (IRON AGE METALWORKING INTERNATIONAL, IN FOUR LANGUAGES), AND IN THE SPRING OF 1966, TO THE BUREAU OF PUBLIC INFORMATION OF THE NEW JERSEY DEPARTMENT OF TRANSPORTATION.

HE HAS BEEN TECHNICAL EDITOR OF THE DIVISION OF RESEARCH AND EVALUATION SINCE THE FALL OF 1966.



IRWIN F. FIKE

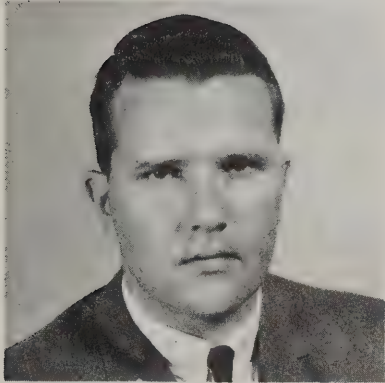
MR. FIKE JOINED THE DIVISION OF RESEARCH AND EVALUATION IN APRIL 1968 AND IS CURRENTLY SERVING AS A SENIOR ENGINEER IN THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS.

MR. FIKE IS A GRADUATE OF BOTH THE U. S. NAVAL ACADEMY AND MASSACHUSETTS INSTITUTE OF TECHNOLOGY WHERE HE EARNED BACHELOR OF SCIENCE AND MASTER OF SCIENCE DEGREES. HE IS ALSO A GRADUATE AND EX-FACULTY MEMBER OF THE INDUSTRIAL COLLEGE FOR THE ARMED FORCES.

HIS PROFESSIONAL LIFE HAS BEEN PRIMARILY THE DESIGN OF NAVAL SHIPS AND SHIP SYSTEMS WHERE MANY IMPORTANT CONTRIBUTIONS WERE MADE. TWO CURRENT NAVAL SHIP DESIGNS AND SEVERAL SYSTEMS ARE THE DIRECT RESULT OF HIS ENDEAVOR. IN ADDITION, HIS LAST NAVY ASSIGNMENT WAS THAT OF COMMANDING OFFICER AND DIRECTOR OF THE U. S. NAVAL APPLIED SCIENCE LABORATORY WHERE MAJOR RESEARCH PROGRAMS IN ELECTRONICS, MATERIALS, CHEMISTRY AND NAVIGATION WERE INVOLVED.

SINCE RETIREMENT FROM THE NAVY IN 1966 HE HAS ALSO BEEN PROGRAM MANAGER FOR DESIGN AND DEVELOPMENT OF AIRCRAFT MAP PLOTTERS, AND PROJECT ENGINEER FOR DEVELOPMENT OF DEEP SUBMERGENCE ELECTRIC MOTORS, BOTH WITH COMMERCIAL FIRMS.

HE IS A MEMBER OF THE SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS AND THE SCIENTIFIC RESEARCH SOCIETY OF AMERICA. HE IS ALSO A PROFESSIONAL ENGINEER IN THE STATE OF NEW JERSEY.



DAVID W. GWYNN

BEFORE JOINING THE NEW JERSEY DEPARTMENT OF TRANSPORTATION IN MAY 1965 AS SUPERVISING ENGINEER OF THE BUREAU OF SAFETY AND TRAFFIC, DIVISION OF RESEARCH AND EVALUATION, MR. GWYNN WAS A RESEARCH ASSISTANT IN THE CIVIL ENGINEERING DEPARTMENT AT WEST VIRGINIA UNIVERSITY. WHILE AT THE UNIVERSITY, HE CONDUCTED RESEARCH DEALING WITH MASS TRANSPORTATION PLANNING FOR THE UNIVERSITY. PRIOR TO HIS ASSOCIATION WITH THE UNIVERSITY, HE WAS EMPLOYED FOR FIVE YEARS WITH THE VIRGINIA DEPARTMENT OF HIGHWAYS AS ENGINEER TRAINEE, TRAFFIC ENGINEER AND DISTRICT TRAFFIC ENGINEER. IN THESE POSITIONS HE ASSISTED IN TRAFFIC ENGINEERING STUDIES, BOTH PLANNING AND OPERATIONS AND WAS RESPONSIBLE FOR ALL TRAFFIC ENGINEERING FUNCTIONS WITHIN A TEN COUNTY AREA.

IN HIS PRESENT POSITION, HE IS RESPONSIBLE TO THE DIRECTOR OF RESEARCH AND EVALUATION FOR ALL RESEARCH STUDIES CONDUCTED BY THE DEPARTMENT OF TRANSPORTATION INVOLVING TRAFFIC ENGINEERING, HIGHWAY PLANNING AND HIGHWAY SAFETY.

MR. GWYNN HOLDS A B.S.C.E. DEGREE FROM VIRGINIA MILITARY INSTITUTE; IS A GRADUATE OF THE YALE UNIVERSITY BUREAU OF HIGHWAY TRAFFIC AND HOLDS AN M.S.C.E. DEGREE FROM WEST VIRGINIA UNIVERSITY.

HE IS AN ASSOCIATE MEMBER OF THE INSTITUTE OF TRAFFIC ENGINEERS, A MEMBER OF SEVERAL TECHNICAL COMMITTEES WITHIN THE INSTITUTE AND IS A MEMBER OF THE STANDING COMMITTEE OF DEPARTMENT 10 (SECTION TECHNICAL ACTIVITIES) OF THE INSTITUTE. HE IS ALSO PAST SECTION TECHNICAL DIRECTOR FOR THE NEW YORK MET. SECTION OF THE I.T.E. AND IS CURRENTLY ITS SECRETARY-TREASURER. MR. GWYNN IS A MEMBER OF THE HIGHWAY RESEARCH BOARD AND IS A MEMBER OF COMMITTEES T.O. 6 (HIGHWAY SAFETY), T.O. 7 (QUALITY OF TRAFFIC SERVICE) AND T.O. 8 (VEHICLE CHARACTERISTICS). HE IS A REGISTERED PROFESSIONAL ENGINEER IN NEW JERSEY.

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DAVID W. GWYNN (CONT'D)

MR. GWYNN IS ALSO A VISITING LECTURER IN CIVIL ENGINEERING AT RUTGERS UNIVERSITY.

MR. GWYNN HAS WRITTEN AND/OR PUBLISHED THE FOLLOWING PAPERS:

1. USE OF TRAFFIC FLOW MEASUREMENTS TO EVALUATE SIGNAL TIMINGS (UNPUBLISHED THESIS - YALE UNIVERSITY)
2. INTER-CAMPUS TRANSPORTATION AT WEST VIRGINIA UNIVERSITY (UNPUBLISHED THESIS - WEST VIRGINIA UNIVERSITY)
3. "EVALUATION OF TRAFFIC CONTROL DEVICES IN VIRGINIA'S MUNICIPALITIES" - PUBLISHED - TRAFFIC ENGINEERING MAGAZINE, MAY 1964
4. "LOW LEVEL BRIDGE LIGHTING IN NEW JERSEY" - PUBLISHED - TRAFFIC ENGINEERING MAGAZINE, DECEMBER 1965
5. "ACCIDENTS AND ACCESS CONTROL" - PUBLISHED - TRAFFIC ENGINEERING MAGAZINE, NOVEMBER 1966
6. "RELATIONSHIP OF ACCIDENT RATES AND ACCIDENT INVOLVEMENTS WITH HOURLY VOLUMES" - PUBLISHED - TRAFFIC QUARTERLY, JULY 1967
7. "TRUCK EQUIVALENCY" - PUBLISHED - APRIL 1968 BY TRAFFIC QUARTERLY, PRESENTED TO CAPACITY COMMITTEE AT 46TH ANNUAL MEETING OF HIGHWAY RESEARCH BOARD
8. "YIELD SIGN STUDY" - PRESENTED AT 47TH ANNUAL MEETING OF HIGHWAY RESEARCH BOARD TO TRAFFIC OPERATION COMMITTEE
9. "RED COLORED PAVEMENT" - PRESENTED AT 47TH ANNUAL MEETING OF HIGHWAY RESEARCH BOARD
10. "TWO WIRE EMERGENCY CALL SYSTEM" - PRESENTED AT 1ST CONFERENCE ON HIGHWAY COMMUNICATIONS FOR SAFETY AND SERVICE IN DENVER, COLORADO IN AUGUST 1967
11. "SUMMARY OF SUFFICIENCY RATING ELEMENTS" - RESEARCH REPORT - NEW JERSEY DEPARTMENT OF TRANSPORTATION



JOHN L. HALLER

UPON GRADUATION, MR. HALLER BEGAN HIS PROFESSIONAL CAREER WITH THE NEW JERSEY DEPARTMENT OF TRANSPORTATION IN JULY 1956 AND UNTIL MARCH 1964, HE WAS ASSIGNED TO THE GEOMETRIC DESIGN GROUP, DIVISION OF ROADS, DESIGN, AND CONSTRUCTION. AT THAT TIME, HE WAS REASSIGNED TO THE FORMER BUREAU OF ENGINEERING RESEARCH, WHICH IN MID-1964 WAS ASSIMILATED INTO THE NEWLY CREATED DIVISION OF RESEARCH AND EVALUATION. HE IS CURRENTLY THE ASSISTANT SUPERVISING ENGINEER OF THE BUREAU OF STRUCTURES AND MATERIALS WITHIN THE AFOREMENTIONED DIVISION.

HE PRESENTED A PAPER AT THE 1968 ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD ENTITLED "EXPERIMENTAL COMPOSITE PAVEMENT IN NEW JERSEY." HE HAS ALSO MADE PRESENTATIONS AT THE NINTH AND ELEVENTH NEW JERSEY ASPHALT PAVING CONFERENCES ENTITLED "INVESTIGATIONS OF ASPHALT PAVING PROBLEMS IN NEW JERSEY" AND "PROGRESS REPORT-EXPERIMENTAL PAVEMENT PROJECT-ROUTE 1-80," RESPECTIVELY.

MR. HALLER RECEIVED HIS BACHELOR OF SCIENCE DEGREE IN CIVIL ENGINEERING FROM DREXEL INSTITUTE OF TECHNOLOGY IN 1956. HE IS A MEMBER OF THE MERCER COUNTY CHAPTER OF THE NEW JERSEY SOCIETY OF PROFESSIONAL ENGINEERS, THE ASSOCIATION OF HIGHWAY OFFICIALS OF THE NORTH ATLANTIC STATES, AND A COMMITTEE MEMBER OF HIGHWAY RESEARCH BOARD COMMITTEE M-7, MAINTENANCE OF BITUMINOUS PAVEMENTS.



ARTHUR A. HEBERLEIN

MR. HEBERLEIN, A MEMBER OF THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS SINCE JULY 1965, COMPLETED A CAREER OF SOME 42 YEARS WITH THE BELL TELEPHONE LABORATORIES TO RETIREMENT BEFORE BECOMING ASSOCIATED WITH THE NEW JERSEY DEPARTMENT OF TRANSPORTATION, DIVISION OF RESEARCH AND EVALUATION. HIS INTERESTS AND EXPERIENCE COVERED MANY AREAS OF THE COMMUNICATION FIELD IN THE BELL SYSTEM. AS A MEMBER OF THE LABORATORIES' TECHNICAL STAFF, TYPICAL RESPONSIBILITIES INCLUDE THE FOLLOWING:

- A. FIELD TRIAL ENGINEERING IN THE ORIGINAL DEVELOPMENT OF LONG HAUL CARRIER TELEPHONE SYSTEMS.
- B. FIELD TRIALS AND APPLICATION STUDIES IN CONNECTION WITH THE DEVELOPMENT OF LONG LIVED ELECTRON TUBES FOR THE BELL SYSTEM. THIS ALSO COVERED THE DEVELOPMENT OF METHODS AND TEST SETS FOR ELECTRON TUBE MAINTENANCE.
- C. IN THE FIELD OF MILITARY RELIABILITY, SPECIALIZED IN THE ASSESSMENT AND FAILURE ANALYSIS OF PILOT LAMPS, INDICATING DEVICES, COUNTER TUBES, AND THE ORIGINAL DEVELOPMENT OF LABORATORY LIFE TEST GEAR.

SINCE JULY 1965 PARTICIPATED IN DEVELOPMENT AND EVALUATION EFFORT IN FEASIBILITY STUDIES OF "TALKING PAVEMENTS," RADIO OR AUDIO DIRECTIONS FOR MOTORISTS AND MOST RECENTLY ON EMERGENCY CALL SYSTEMS.

MR. HEBERLEIN IS A GRADUATE OF THE COLLEGE OF THE CITY OF NEW YORK WITH A DEGREE OF BACHELOR OF SCIENCE IN ENGINEERING IN 1921. DURING HIS SENIOR YEAR HE WAS ASSOCIATED WITH THE CCNY PHYSICS DEPARTMENT AS AN ACTIVE INSTRUCTING TUTOR. SUBSEQUENTLY, IN JUNE 1923 HE ACQUIRED THE DEGREE OF ELECTRICAL ENGINEER (WHICH IS NOW EQUIVALENT TO A MASTER OF SCIENCE IN ELECTRICAL ENGINEERING) AS A RESULT OF POST GRADUATE STUDY AT THE POLYTECHNIC INSTITUTE OF BROOKLYN. THIS WAS PRIOR TO JOINING THE DEPARTMENT OF DEVELOPMENT AND RESEARCH OF THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY AS AN ENGINEER IN JULY 1922.

CONTINUED----

ARTHUR A. HEBERLEIN (Cont'd)

HE PARTICIPATED IN A BRIEF ENLISTMENT IN THE U. S. ARMY IN THE SUMMER AND FALL OF 1918 WHICH WAS TERMINATED BY THE END OF WORLD WAR I, AS OF DECEMBER 1918.

MR. HEBERLEIN IS A SENIOR MEMBER (1948) OF THE INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS, AS WELL AS A MEMBER OF THE AUDIO-ELECTROACOUSTICS AND VEHICULAR COMMUNICATIONS GROUPS. HE WAS APPOINTED A MEMBER OF THE SC-3 ELECTRONIC RESEARCH IN THE HIGHWAY FIELD COMMITTEE OF THE HIGHWAY RESEARCH BOARD, WASHINGTON, D. C. (JULY 1966). HE IS A REGISTERED PROFESSIONAL ENGINEER (P.E.) IN THE STATE OF NEW YORK SINCE AUGUST 1936.

PUBLICATIONS

IN THIS CONNECTION HE WAS RESPONSIBLE FOR WRITING AND EDITING ALL BELL SYSTEM PRACTICES DESCRIBING ELECTRON TUBE TEST SETS AND FIELD OPERATING PROCEDURES. HE WAS THE AUTHOR OF A PAPER APPEARING IN THE BELL LABORATORIES RECORD, MAY 1958, SUBJECT: "A NEW PORTABLE ELECTRON TUBE TESTER."



EDGAR J. HELLRIEGEL

MR. HELLRIEGEL JOINED THE DIVISION OF RESEARCH AND EVALUATION IN AUGUST 1967 AS A SENIOR ENGINEER ASSIGNED TO THE BUREAU OF STRUCTURES AND MATERIALS.

HIS ACTIVITIES COVER A BROAD SPECTRUM IN THE CERAMIC FIELD FROM THE INVESTIGATION OF GEOLOGICAL DEPOSITS FOR RAW MATERIALS TO DEVELOPING STANDARD TEST METHODS FOR EVALUATION AND CONTROL FOR BOTH LABORATORY AND PRODUCTION FACILITIES.

MR. HELLRIEGEL HAS SEVENTEEN YEARS OF EXPERIENCE IN R&D, ENGINEERING AND QUALITY CONTROL WITH M&T CHEMICALS, THE AMERICAN VITRIFIED CLAY PRODUCTS, AND THE ROBINSON CLAY PRODUCTS COMPANY.

MR. HELLRIEGEL WAS GRADUATED WITH A BACHELOR OF SCIENCE DEGREE IN CERAMIC ENGINEERING FROM THE UNIVERSITY OF MISSOURI, SCHOOL OF MINES AND METALLURGY IN 1950 AND HAS ATTENDED SPECIAL SUMMER PROGRAMS AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND RUTGERS CENTER FOR CONTINUING ENGINEERING STUDIES.

HE IS A MEMBER OF THE AMERICAN CERAMIC SOCIETY, THE NATIONAL INSTITUTE OF CERAMIC ENGINEERS, ASTM C-21 SUB-COMMITTEE III AND KERAMOS, THE NATIONAL HONORARY SOCIETY FOR CERAMIC ENGINEERS.

MR. HELLRIEGEL HAS PRESENTED PAPERS BEFORE THE AMERICAN, CANADIAN AND MEXICAN CERAMIC SOCIETIES IN 1962, 1963 AND 1964. HE HOLDS A BRITISH PATENT 932,183 WITH THE U. S. PATENT PENDING.



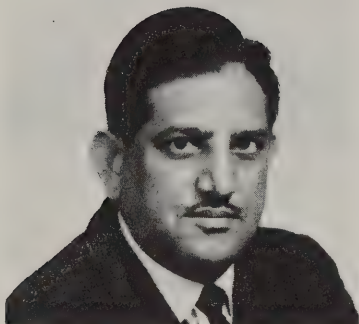
RICHARD L. HOLLINGER

MR. HOLLINGER RECEIVED A BACHELOR OF SCIENCE DEGREE IN CHEMISTRY FROM JUNIATA COLLEGE IN 1963. HE WAS EMPLOYED AS A RESEARCH ASSISTANT AT JUNIATA COLLEGE UNTIL THE FALL OF 1964. HE THEN ACCEPTED EMPLOYMENT WITH THE PHYSICS DEPARTMENT OF JUNIATA AS AN ELECTRONICS ASSISTANT. IN JUNE OF 1965 HE ACCEPTED EMPLOYMENT AS AN ENGINEER OF RESEARCH WITH THE DIVISION OF RESEARCH AND EVALUATION OF THE NEW JERSEY STATE HIGHWAY DEPARTMENT, WITH WHICH HE IS PRESENTLY EMPLOYED.

MR. HOLLINGER'S DUTIES INCLUDE COMPUTER PROGRAMMING AND THE STUDY OF CONTROL OF AUTOMOBILE EXHAUST POLLUTION.

PROJECTS FOR WHICH HE HAS WRITTEN COMPUTER PROGRAMS INCLUDE: ACCIDENT DESIGN RELATIONSHIP; INTERSECTION DESIGN; TRUCK EQUIVALENT; SPEED STUDIES, "BEFORE AND AFTER"; TRAFFIC GENERATORS; FATAL ACCIDENT STUDY; AND MILEPOST STUDY.

DURING THE SUMMER OF 1967, MR. HOLLINGER ATTENDED THE GORDON RESEARCH CONFERENCE ON ENVIRONMENTAL SCIENCES: AIR.



MUNIREDDY V. JAGANNATH

MR. JAGANNATH JOINED THE DIVISION IN MAY 1967 AS AN ASSISTANT HIGHWAY ENGINEER WITHIN THE BUREAU OF SAFETY AND TRAFFIC.

MR. JAGANNATH RECEIVED HIS BACHELOR'S DEGREE IN CIVIL ENGINEERING FROM THE UNIVERSITY OF MYSORE, BANGALORE, INDIA, IN 1958. HE WAS THEN EMPLOYED IN INDIA AS A CIVIL ENGINEER IN A SUPERVISORY CATEGORY ON SUCH PROJECTS AS INDUSTRIAL BUILDINGS AND ROADS UNTIL AUGUST 1966. FROM SEPTEMBER 14, 1966 UNTIL MAY 1967 HE WAS ENROLLED AS A GRADUATE STUDENT AT WEST VIRGINIA UNIVERSITY. HE COMPLETED THE FOLLOWING COURSES: HIGHWAY PLANNING, TRAFFIC ENGINEERING I, TRAFFIC OPERATIONS II, URBAN GEOGRAPHY, GEOMETRIC DESIGN, TRANSPORTATION DESIGN, AND TRANSPORTATION PROJECTS. HE EXPECTS TO COMPLETE HIS MASTER'S DEGREE IN CIVIL ENGINEERING.



ARTHUR C. JOHNSON

MR. JOHNSON JOINED THE NEW JERSEY DEPARTMENT OF TRANSPORTATION AS A PRINCIPAL ENGINEER, RESEARCH, IN THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS IN APRIL 1967.

PRIOR TO THAT TIME, HE WAS EMPLOYED AS A SUPERVISOR IN THE ELECTRIC DEPARTMENT, CENTRAL MAINTENANCE DIVISION, UNITED STEEL CORPORTATION, FAIRLESS WORKS. HE BEGAN HIS PROFESSIONAL CAREER THERE IN JUNE 1965 AS A MANAGEMENT TRAINEE.

MR. JOHNSON RECEIVED A BACHELOR OF SCIENCE DEGREE IN ELECTRICAL ENGINEERING FROM THE UNIVERSITY OF NEW HAMPSHIRE IN JUNE 1965. HE OBTAINED AN ASSOCIATE BACHELOR OF SCIENCE DEGREE IN ELECTRONICS ENGINEERING FROM WENTWORTH INSTITUTE OF TECHNOLOGY IN JUNE 1959. HE IS PRESENTLY DOING GRADUATE WORK IN ENGINEERING SCIENCE AT THE PENNSYLVANIA STATE UNIVERSITY, KING OF PRUSSIA GRADUATE CENTER.

MR. JOHNSON IS A MEMBER OF THE ASSOCIATION OF IRON AND STEEL ENGINEERS AND PI MU DELTA FRATERNITY, AND HOLDS A THIRD CLASS RADIO TELEPHONE LICENSE. HE HAS BEEN A MEMBER OF THE INSTITUTE OF RADIO ENGINEERS, AND WAS AN ACTIVE MEMBER OF THE INSTITUTE OF ELECTRONICS AND ELECTRICAL ENGINEERS FOR SEVEN YEARS FROM 1959 TO 1965.

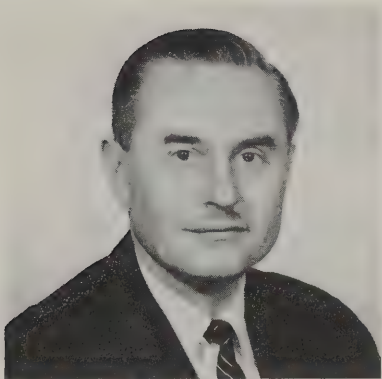


MARY T. KONDASH

MISS KONDASH JOINED THE STAFF OF THE DIVISION OF RESEARCH AND EVALUATION OF THE NEW JERSEY DEPARTMENT OF TRANSPORTATION IN JUNE 1967 AS AN ASSISTANT ENGINEER FOR THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS.

SINCE SHE IS A 1967 COLLEGE GRADUATE, HER PROFESSIONAL CONTRIBUTIONS AT THIS TIME ARE LIMITED. HOWEVER, SHE HAS WORKED ON PAVEMENT HEATING FOR HER BUREAU AND IS PRESENTLY WRITING A COMPUTER PROGRAM TO SIMULATE TRAFFIC FLOW.

MISS KONDASH IS A GRADUATE OF RUTGERS - COLLEGE OF SOUTH JERSEY WITH A B.A. DEGREE IN MATHEMATICS AND IS A MEMBER OF PI MU EPSILON, A NATIONAL HONORARY MATHEMATICS SOCIETY. PRESENTLY, SHE IS ATTENDING DREXEL INSTITUTE OF TECHNOLOGY WORKING TOWARD A M.S. DEGREE IN MATHEMATICS.



GEORGE S. KOZLOV

MR. KOZLOV BEGAN HIS PROFESSIONAL CAREER AFTER GRADUATING FROM THE TECHNICAL UNIVERSITY IN MUNICH, GERMANY (DIPLOM-INGENIEUR) IN 1943. HE ALSO COMPLETED GRADUATE STUDIES IN CIVIL AND STRUCTURAL ENGINEERING.

BEFORE JOINING THE DIVISION OF RESEARCH AND EVALUATION, BUREAU OF STRUCTURES AND MATERIALS, IN FEBRUARY 1965 AS A HIGHWAY ENGINEER, RESEARCH, MR. KOZLOV WAS ASSOCIATED WITH THE NEW JERSEY DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT, DIVISION OF WATER POLICY AND SUPPLY, BUREAU OF DESIGN AND CONSTRUCTION IN THE CAPACITY OF A SUPERVISING ENGINEER. THE BUREAU ADMINISTERED THE PLANNING, DESIGN, AND CONSTRUCTION OF ALL PHASES OF THE ROUND VALLEY-SPRUCE RUN RESERVOIR PROJECT. HIS DUTIES INCLUDED REAL ESTATE PROBLEMS AND REVIEW OF DESIGNS, DRAWINGS, AND SPECIFICATIONS. HE PARTICIPATED IN EVERY PHASE OF PLANNING AND DESIGN FOR THE PROJECT NOTED, BUT HIS MAIN RESPONSIBILITY WAS THE REVIEW FOR ADEQUACY AND SAFETY OF ALL STRUCTURAL DESIGN.

BEFORE THAT, HE WAS ENGAGED IN THE CAPACITY OF STRUCTURAL ENGINEER IN DESIGN AND CONSTRUCTION WITH SEVERAL PRIVATE CONSULTANTS AND INDUSTRIAL ORGANIZATIONS. SOME OF HIS ASSOCIATIONS INCLUDED THE FOLLOWING: FOSTER WHEELER CORPORATION, EBASCO SERVICE, INC., JOHNS-MANVILLE CORPORATION AND OVERSEAS, NEGRELLI A. G. IN VIENNA, AUSTRIA. HIS DUTIES INCLUDED SUPERVISION, DESIGN, INVESTIGATION AND SOME FIELD ASSIGNMENTS, PRIMARILY IN THE U.S.A. THEY COVERED STEEL, REINFORCED CONCRETE, MASONRY AND WOOD STRUCTURES, SUCH AS POWER STATIONS, FACTORY BUILDINGS, PUMPING STATIONS, BOILER STRUCTURES, CONCRETE AND STEEL PIPING SYSTEMS, CONDUITS AND TUNNELS, SOME BRIDGES, ROADS AND SEWER AND DRAINAGE SYSTEMS.

IN OUR DIVISION HE SERVED MAINLY IN THE FIELD OF BRIDGE DESIGN AND CONSTRUCTION, WHERE HE CONSIDERS THE PROJECT OF PREFORMED ELASTOMERIC BRIDGE JOINT SEALERS HIS OUTSTANDING CONTRIBUTION. HE PRESENTED HIS PAPER ON THIS SUBJECT AT THE ANNUAL HIGHWAY RESEARCH BOARD MEETING IN WASHINGTON, D. C., IN JANUARY 1967.

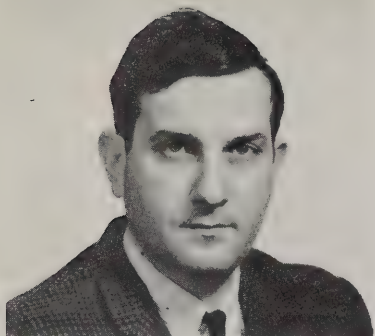
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GEORGE S. KOZLOV (CONT'D)

AS A RESULT OF THIS WORK, HE WAS MADE A MEMBER OF ASTM TASK GROUP "G" IN CHARGE OF DEVELOPING SPECIFICATIONS FOR THESE SEALERS. WHEN SUBSEQUENTLY A SEPARATE TASK GROUP "J" WAS FORMED TO DEAL WITH THE BRIDGE SEALERS, HE BECAME ITS CHAIRMAN.

HE ATTENDED THE RELEVANT MEETINGS OF SUB-COMMITTEES AND GROUPS IN JUNE 1966 IN ATLANTIC CITY, JUNE 1967 IN BOSTON, NOVEMBER 1967 IN TRENTON, JANUARY 1968 IN ATLANTIC CITY, APRIL 1968 IN TRENTON, AND JUNE 1968 IN SAN FRANCISCO.

MR. KOZLOV HAS BEEN A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NEW JERSEY SINCE 1957.



JERRY KRAFT

MR. KRAFT JOINED THE DIVISION IN FEBRUARY 1965 AS AN ASSISTANT ENGINEER; IN AUGUST 1967 HE WAS PROMOTED TO A PRINCIPAL ENGINEER WITHIN THE BUREAU OF SAFETY AND TRAFFIC.

MR. KRAFT WAS BORN IN ISRAEL AND THERE GRADUATED FROM HIGH SCHOOL. HE SERVED IN THE ISRAELI AIR FORCE FOR TWO YEARS AND THEN CAME TO THE UNITED STATES IN 1960 AND ENTERED CITY COLLEGE IN NEW YORK IN THAT YEAR. IN 1965 HE OBTAINED A B.S. DEGREE IN MATHEMATICS.

IN AUGUST 1966 MR. KRAFT OBTAINED A LEAVE OF ABSENCE FROM THE DIVISION AND ENTERED WEST VIRGINIA UNIVERSITY AS A GRADUATE RESEARCH ASSISTANT. AFTER RECEIVING AN M.S.E. DEGREE IN TRANSPORTATION ENGINEERING, MR. KRAFT RETURNED TO THE DIVISION.

MR. KRAFT IS AN AUTHOR OF AN UNPUBLISHED MASTER THESIS NAMED, "INVESTIGATION OF TRAFFIC OPERATION AT A JUG HANDLE SIGNALIZED INTERSECTION."

HE IS A JUNIOR MEMBER OF THE INSTITUTE OF TRAFFIC ENGINEERS AND A MEMBER OF THE NEW YORK-NEW JERSEY METROPOLITAN SECTION OF THE ITE. DURING THE ACADEMIC YEAR 1966-1967 HE SERVED AS A SECRETARY-TREASURER OF THE ITE STUDENT CHAPTER AT WEST VIRGINIA UNIVERSITY. MR. KRAFT IS ALSO A MEMBER OF COMMITTEE TO-7, QUALITY OF TRAFFIC FLOW, HIGHWAY RESEARCH BOARD.

HE IS CURRENTLY RESPONSIBLE FOR CONDUCTING A STUDY WHICH INVESTIGATES SPEED CHANGE CHARACTERISTICS ON VARIOUS TYPES OF HIGHWAY IN NEW JERSEY.



J. CRAWFORD MACFADYEN

MR. MACFADYEN JOINED THE DIVISION OF RESEARCH AND EVALUATION IN APRIL 1968.

IN THIS SHORT TIME WITH THE DIVISION HE HAS BEEN FAMILIARIZING HIMSELF WITH THE FOG ABATEMENT, THE TWO-WIRE EMERGENCY CALL SYSTEM AND T.V. SURVEILLANCE PROJECTS.

HE IS A GRADUATE CIVIL ENGINEER, RECEIVING THE B.S. DEGREE FROM DREXEL INSTITUTE OF TECHNOLOGY.

FOR THE PAST TWENTY-FIVE YEARS HE HAS BEEN ENGAGED IN RESEARCH, DESIGN AND DEVELOPMENT IN THE AIRCRAFT AND AEROSPACE INDUSTRY.

HE IS A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF PENNSYLVANIA.



MRS. FANCHON MELTON

BEFORE JOINING THE NEW JERSEY DEPARTMENT OF TRANSPORTATION, MRS. MELTON WAS EMPLOYED BY THE NEW YORK CITY DEPARTMENT OF TRAFFIC FOR FIVE YEARS. HER DUTIES BEGAN AS A JUNIOR ENGINEER IN THE PARKING DIVISION. SHE WAS RESPONSIBLE FOR THE SELECTION AND PRELIMINARY SPECIFICATIONS OF OFF-STREET PARKING FACILITIES; BOTH PARKING LOTS AND RAMP TYPE GARAGES. THIRTEEN OF THESE FACILITIES ARE NOW IN SUCCESSFUL OPERATION. LATER ASSIGNED TO THE NOW DEFUNCT NEW YORK CITY HIGHWAY TRANSPORTATION STUDIES GROUP AS A HIGHWAY RESEARCH SPECIALIST, SHE SUPERVISED A LARGE DRAFTING SERVICE AS WELL AS WRITING TEXT FOR REPORTS PUBLISHED BY THE GROUP. HER ACCOMPLISHMENTS DURING THIS PERIOD WERE THE FIRST COMPREHENSIVE TRAFFIC FLOW MAPS AND INVENTORY MAPS OF THE FIVE BOROUGHES TO BE PUBLISHED AS WELL AS ORIGIN-DESTINATION STUDIES.

PRIOR TO HER EMPLOYMENT BY THE DEPARTMENT OF TRAFFIC, SHE WAS WITH DELEUW, CATHER AND COMPANY AND WORKED ON A BI-STATE TRANSIT LOOP STUDY.

WHILE HER HUSBAND WAS IN SERVICE WITH THE U. S. ARMY, SHE SERVED AS A CARTOGRAPHER FOR THE INTER-AMERICAN GEODETIC SURVEY, AN ARMY MAP SERVICE BASED IN THE PANAMA CANAL ZONE.

SHE JOINED THE STAFF OF THE DIVISION OF RESEARCH AND EVALUATION AS A RESEARCH ENGINEER IN OCTOBER 1965. HER ASSIGNMENTS HAVE INCLUDED EVALUATION OF REFLECTORIZED SIGNING AND PAVEMENT MARKINGS AS WELL AS A CONTINUING PROJECT STUDYING INTERSECTION DESIGNS. A TOTAL OF 30 INTERSECTIONS ARE BEING STUDIED TO PROVIDE COMPARATIVE ANALYSIS OF ACCIDENTS AND TRAVEL TIMES FOR INDIVIDUAL MOVEMENTS.

MRS. MELTON IS A GRADUATE CIVIL ENGINEER FROM THE CITY COLLEGE OF THE CITY OF NEW YORK (1958) AND IS AN ASSOCIATE MEMBER OF THE INSTITUTE OF TRAFFIC ENGINEERS.



JOHN C. O'CONNOR

MR. O'CONNOR BEGAN HIS PROFESSIONAL CAREER IN 1937 AS AN AERONAUTICAL ENGINEER IN THE GLENN L. MARTIN COMPANY OF BALTIMORE, MARYLAND, FOLLOWING GRADUATION FROM THE UNIVERSITY OF MICHIGAN, B.S. Ae.E., 1936. HE WAS INDEPENDENTLY EMPLOYED FROM

JANUARY 1937 UNTIL JANUARY 1966, EXCEPT FOR DUTY IN THE U. S. ARMY AIR CORPS FROM AUGUST 1942 TO DECEMBER 13, 1945. HIS HIGHWAY DEPARTMENT CAREER STARTED WITH THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS IN JANUARY 1966.

SINCE 1960, MR. O'CONNOR HAS BEEN A PARTNER IN THE ENGINEERING FIRM OF O'CONNOR AND SHEA. HE INVENTED AND SUPERVISED THE BUILDING OF A PLANT AND MACHINERY FOR THE MANUFACTURE OF CONCRETE CONDUITS FOR SALE TO OPERATING COMPANIES OF THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY.

IN 1957, 1958 AND 1959 MR. O'CONNOR HELD A CONSULTING ENGINEERING CONTRACT WITH THE BELL TELEPHONE LABORATORIES, INC. TO INVESTIGATE THE CAUSES OF FAILURE OF GUIDANCE PACKAGES IN HERCULES AND ZEUS GUIDED MISSILES, DUE TO VIBRATIONS, AND TO DEVISE MEANS TO ATTENUATE THESE CAUSES OF FAILURE.

FROM 1946 TO 1956 HE CAUSED THE FORMATION OF THREE CORPORATIONS, THE O'CONNOR MACHINE WORKS, INC. (MANUFACTURER OF VIBRATION GENERATORS USED IN CONCRETE BLOCK MACHINES, VIBRATORY CONVEYORS, CONCRETE CONSISTOMETERS AND TACONITE IRON ORE PELLETIZERS); THE O'CONNOR PATENT COMPANY (OWNER OF NINE PATENTED INVENTIONS OF MR. O'CONNOR); AND THE O'CONNOR ABRASIVE WHEEL COMPANY (MANUFACTURER OF SEGMENTAL TYPE ABRASIVE WHEELS FOR HIGH PRODUCTION GRINDING MACHINES). IN ADDITION TO ENGINEERING MATTERS RELATED TO THESE COMPANIES HE ATTENDED TO PATENT LICENSES AND TAX LITIGATION.

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JOHN C. O'CONNOR (CONT'D)

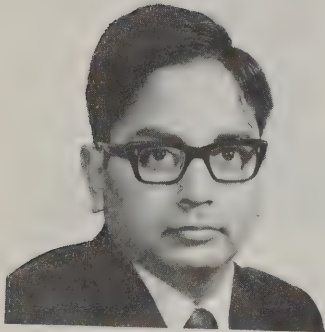
IN 1942, 1943, 1944 AND 1945 HE WAS WITH THE MATERIEL COMMAND OF THE ARMY AIR CORPS, EQUIPMENT LABORATORY, SPECIAL WEAPONS SECTION, AS A RESEARCH AND DEVELOPMENT ENGINEER OFFICER, WHERE HE INVENTED A GROUND SKIMMING GLIDE BOMB AND CONCEIVED OF AND EXECUTED THE NAVIGATIONAL TEST PROGRAM FOR THE AMERICAN COPY OF THE GERMAN V-1 MISSILE.

BETWEEN 1937 AND 1942 HE INVENTED A GLARELESS AUTOMOBILE HEADLIGHT, PERFORMED CONSULTING ENGINEERING SERVICES TO THE CONCRETE MASONRY INDUSTRY, DEvised A TECHNOLOGY FOR QUIETING NOISY MACHINES, PERFORMED ACOUSTICAL ENGINEERING SERVICES, AND INVENTED A RADIANT COOLING MEANS FOR HOSPITAL OPERATING ROOMS.

IN ADDITION TO ATTENDING THE UNIVERSITY OF MICHIGAN, HE ALSO ATTENDED THE UNIVERSITY OF NOTRE DAME, 1930-1933, STUDYING MECHANICAL ENGINEERING.

MR. O'CONNOR IS AN EXPERIENCED GLIDER PILOT, AND HAS BUILT AND SAILED A SCHOONER YACHT ON THE GREAT LAKES.

HE HAS SECURED U. S. AND CANADIAN PATENTS ON A VIBRATION PRODUCING MECHANISM, A ROCKING MIXER, A VIBRATORY DRILLING APPARATUS, AN APPARATUS FOR TRANSMITTING INTENSE VIBRATIONS FOR PERFORMING WORK (SPRING), A VIBRATORY DUMP TRUCK, A MECHANISM FOR PRODUCING HARD VIBRATIONS FOR COMPACTION AND CONVEYING MATERIALS, AS WELL AS AN APPARATUS FOR TRANSMITTING INTENSE VIBRATIONS FOR PERFORMING WORK (ALUMINUM SPRING).



PRAFULL C. PATEL

MR. PATEL RECEIVED HIS BACHELOR DEGREE
IN ELECTRICAL ENGINEERING FROM L. D.
COLLEGE OF ENGINEERING OF GUJARAT

UNIVERSITY, AHMEDABAD, INDIA IN 1965. AFTER GRADUATION HE WORKED
AS AN ASSISTANT ENGINEER FOR THE PUBLIC WORKS DEPARTMENT OF GUJARAT
STATE, INDIA, TILL JULY 1966. MR. PATEL'S DUTIES ON THE JOB WERE
TO SUPERVISE AND MAINTAIN GOVERNMENT ELECTRICAL INSTALLATION.

MR. PATEL HAS TAKEN COURSES IN ELECTRICAL ENGINEERING AT
STEVENS INSTITUTE OF TECHNOLOGY, HOBOKEN, NEW JERSEY AND NEWARK
COLLEGE OF ENGINEERING, NEWARK, NEW JERSEY AND HAS RECEIVED HIS
M.S. DEGREE IN ELECTRICAL ENGINEERING.

HE JOINED THE STAFF OF THE DIVISION OF RESEARCH AND
EVALUATION IN JUNE 1967 AS AN ASSISTANT ENGINEER IN THE BUREAU
OF ELECTRONICS AND SCIENTIFIC AIDS.



JOHN J. QUINN

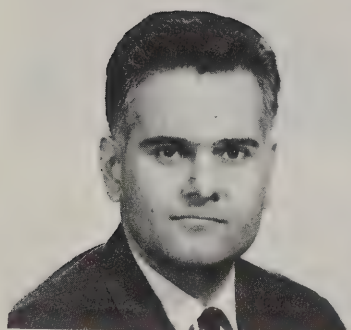
MR. QUINN JOINED THE NEW JERSEY STATE HIGHWAY DEPARTMENT IN DECEMBER 1950 AND WAS ASSIGNED TO THE BUREAU OF ENGINEERING RESEARCH IN OCTOBER 1951. HE WORKED WITH THE BUREAU MAINLY AS CHIEF OF PARTY INVESTIGATING AND EVALUATING VARIOUS PAVEMENTS AND BRIDGES THROUGHOUT THE STATE.

THIS ASSIGNMENT WAS INTERRUPTED FROM 1952 TO 1956 BY SERVICE IN THE U. S. NAVY.

MR. QUINN RECEIVED AN ASSOCIATE OF SCIENCE DEGREE FROM TRENTON JUNIOR COLLEGE IN 1958, WHILE ON LEAVE OF ABSENCE FROM THE DEPARTMENT. HE IS PRESENTLY ATTENDING DREXEL INSTITUTE OF TECHNOLOGY EVENING COLLEGE.

HE IS A MEMBER OF HIGHWAY RESEARCH BOARD COMMITTEE D-B⁴, SURFACE PROPERTIES, VEHICLE INTERACTION.

IN THE FALL OF 1967, MR. QUINN ATTENDED A CONFERENCE ON SKID RESISTANCE AND CORRELATION TESTING OF SKID MEASUREMENT EQUIPMENT IN OCALA, FLORIDA.



RICHARD RAHMAN

MR. RAHMAN JOINED THE DEPARTMENT OF
TRANSPORTATION IN MARCH 1967.

PREVIOUSLY, HE WORKED AS A PLASTICS SPECIALIST WITH THE
BOEING-VERTOL COMPANY; AS MARKET DEVELOPMENT/SALES ENGINEER
FOR THE CELANESE PLASTICS COMPANY; IN MARKETING AND SALES FOR
THE HERCULES POWDER COMPANY AND AS ASSISTANT TRAFFIC ENGINEER
FOR THE DELAWARE STATE HIGHWAY DEPARTMENT.

MR. RAHMAN RECEIVED HIS B.S.M.E. FROM THE PENNSYLVANIA
MILITARY COLLEGE IN 1960. HE IS CURRENTLY WORKING TOWARDS HIS
M.B.A. (OPERATIONS RESEARCH) AND L.L.B.



EUGENE F. REILLY

BEFORE JOINING THE NEW JERSEY STATE HIGHWAY DEPARTMENT IN MAY 1966 AS ASSISTANT SUPERVISING ENGINEER IN THE BUREAU OF SAFETY AND TRAFFIC, MR. REILLY WAS A TRAFFIC ENGINEER FOR THE PORT OF NEW YORK AUTHORITY. IN THE TRAFFIC ENGINEERING DIVISION HIS DUTIES INCLUDED THE DESIGN OF PROPOSED FACILITIES AND THE SAFETY IMPROVEMENTS TO EXISTING TERMINAL ROADWAYS. HE ALSO REVIEWED CONSTRUCTION PLANS TO INSURE SAFE CONSTRUCTION PRACTICE AND DESIGN.

PRIOR TO HIS EMPLOYMENT WITH THE PORT AUTHORITY, HE WAS WITH THE CONSULTING FIRM OF TIPPETTS-ABBETT-McCARTHY-STRATTON. AS A TRAFFIC ENGINEER, HE WORKED ON THE REGIONAL PLAN FOR KANAWHA COUNTY IN WEST VIRGINIA. AS A HIGHWAY ENGINEER, HE DESIGNED THE DRAINAGE SYSTEMS FOR PORTIONS OF THE VAN WYCK EXPRESSWAY IN NEW YORK AND SERVED AS ASSISTANT PROJECT ENGINEER ON HIGHWAY PROJECTS IN ALASKA. HE WAS ALSO INSPECTION SUPERVISOR FOR THE KEW GARDEN-VAN WYCK INTERCHANGE IN NEW YORK. AT PRESENT, HIS DUTIES INCLUDE THE SUPERVISION OF ALL RESEARCH PROJECTS WITHIN THE BUREAU.

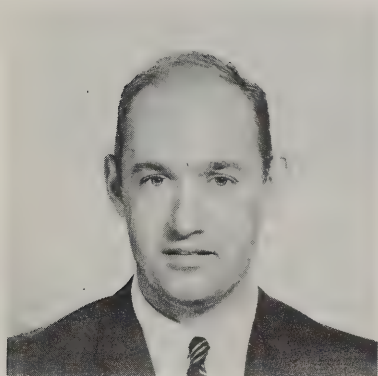
MR. REILLY IS A GRADUATE OF MANHATTAN COLLEGE (1957) WITH A B.S. DEGREE IN ENGINEERING AND HOLDS A MASTER'S DEGREE FROM THE CITY COLLEGE OF NEW YORK (1962). HE IS ALSO A GRADUATE OF THE YALE UNIVERSITY BUREAU OF HIGHWAY TRAFFIC. HE IS SERVING ON COMMITTEES IN THE INSTITUTE OF TRAFFIC ENGINEERS AND THE HIGHWAY RESEARCH BOARD. HE IS A REGISTERED PROFESSIONAL ENGINEER.

HE IS AUTHOR OF THE FOLLOWING REPORTS:

"WEATHER AND VEHICULAR ACCIDENTS," GRADUATE THESIS AT THE BUREAU OF HIGHWAY TRANSPORTATION, UNPUBLISHED.

"30TH PEAK HOUR FACTOR TRENDS," HIGHWAY RESEARCH BOARD RECORD #199.

"TRUCK EQUIVALENCY," PRESENTED AT THE 47TH ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD.



ARTHUR W. ROBERTS

BEFORE JOINING THE NEW JERSEY DEPARTMENT
OF TRANSPORTATION IN JULY 1967,

MR. ROBERTS TRAINED FOR INDUSTRIAL
MANAGEMENT IN THE AMERICAN CAN COMPANY, BECOMING ONE OF THEIR
QUALITY CONTROL ENGINEERS.

HE IS NOW APPLYING HIS PSYCHOLOGY AND INDUSTRIAL ENGINEERING
BACKGROUND TO CONCEPTS IN SAFETY AND TRAFFIC IN STUDIES INVOLVING
FATAL ACCIDENTS, MANPOWER NEEDS, AND TRAFFIC DEVICE EVALUATION.

MR. ROBERTS GRADUATED FROM LEHIGH UNIVERSITY IN 1960 WITH
A B.A. IN INDUSTRIAL PSYCHOLOGY.



FREDERICK H. SCHEER

MR. SCHEER IS PRESENTLY EMPLOYED AS A PRINCIPAL ENGINEER IN THE NEW JERSEY DEPARTMENT OF TRANSPORTATION, DIVISION OF RESEARCH AND EVALUATION, BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS. HE FORMERLY WORKED A TOTAL OF 27 YEARS FOR THE WESTINGHOUSE ELECTRIC CORPORATION PRINCIPALLY IN ENGINEERING. THE WORK ENCOMPASSED GOVERNMENT AND COMMERCIAL RADIO AND HOME TELEVISION, HIGH FIDELITY, AND RADIO RECEIVERS. HE RETIRED FROM THE METUCHEN, NEW JERSEY PLANT IN 1964 WHERE HE WAS AN ENGINEERING SECTION MANAGER IN CHARGE OF ENGINEERING TECHNICAL SERVICES.

MR. SCHEER IS A GRADUATE OF THE WORCESTER POLYTECHNIC INSTITUTE, RECEIVING A BACHELOR OF SCIENCE DEGREE IN CHEMISTRY IN 1923. HE HAS EARNED ADDITIONAL ACADEMIC CREDITS IN MATHEMATICS FROM THE UNIVERSITY OF BUFFALO AND IN STATISTICS SINCE BEING IN THE STATE EMPLOYMENT. HE RECENTLY COMPLETED A TRAINING COURSE ON THE BASICS OF MANAGEMENT AND SUPERVISION.

AFTER GRADUATION, HE WORKED AS A SANITARY CHEMIST FOR METCALF AND EDDY, CONSULTANTS.

OTHER ELECTRONIC ENGINEERING EXPERIENCE WAS OBTAINED FROM SERVICE WITH THE WILLIAM H. BRISTOL TALKING PICTURE CORPORATION, FORMERLY A DIVISION OF THE BRISTOL COMPANY; F. W. SICKLES COMPANY, NOW A DIVISION OF THE GENERAL INSTRUMENT CORPORATION; AND COLONIAL RADIO CORPORATION NOW WITH SYLVANIA ELECTRIC PRODUCTS. THE WORK INCLUDED SOUND RECORDING AND REPRODUCTION, RADIO FREQUENCY COIL AND TRANSFORMER DESIGN, BROADCAST AND SHORT WAVE RADIO DEVELOPMENT AND MILITARY TRANSCEIVER CONSIDERATIONS. A NUMBER OF PATENTS HAVE BEEN ASSIGNED TO THESE EMPLOYERS.

HE IS A SENIOR MEMBER OF THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS AND A SENIOR MEMBER OF THE AMERICAN CHEMICAL SOCIETY. OFFICES HELD IN THE FORMER INCLUDE - CHAIRMAN OF THE

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FREDERICK H. SCHEER (CONT'D)

CONNECTICUT VALLEY AND CHAIRMAN OF THE BUFFALO-NIAGARA SECTIONS. HE SERVES ON A COMMITTEE OF THE HIGHWAY RESEARCH BOARD. MEMBERSHIP INCLUDES VARIOUS FRATERNAL AND SERVICE GROUPS PRESENTLY PRESIDENT OF THE PLAINSBORO LIONS CLUB.

PUBLICATIONS INCLUDE: "NOTES ON INTERMEDIATE FREQUENCY DESIGN," PROC. IRE 23.12 (DECEMBER 1935) 1483, "DIODE COUPLING TRANSFORMERS," RMA ENGINEER, VOL. 1, NO. 1 (NOVEMBER 1936) 14, AND NUMEROUS ONES USED FOR INTERNAL COMPANY CIRCULATION.

HE IS LISTED IN "WHO'S WHO IN ENGINEERING," "AMERICAN MEN OF SCIENCE" AND OTHER SIMILAR LISTINGS.



JOSEPH SEIFERT

MR. SEIFERT JOINED THE NEW JERSEY
TRANSPORTATION DEPARTMENT IN MAY 1966
AS A RESEARCH ENGINEER IN THE SAFETY AND
TRAFFIC BUREAU. PRIOR TO THIS, HE WAS A GRADUATE STUDENT IN
TRAFFIC AND PLANNING AT WEST VIRGINIA UNIVERSITY; A CIVIL ENGINEER
WITH THE U. S. FOREST SERVICE AT ELKINS, WEST VIRGINIA; AND AN
ENGINEERING AIDE AT SOUTH ORANGE, NEW JERSEY.

MR. SEIFERT HAS A B.S. DEGREE FROM NEWARK COLLEGE OF
ENGINEERING AND AN M.S. DEGREE FROM WEST VIRGINIA UNIVERSITY.

HE IS A MEMBER OF THE INSTITUTE OF TRAFFIC ENGINEERS, AND
THE HIGHWAY RESEARCH BOARD. HIS RESEARCH INCLUDES WORK ON TRUCK
EQUIVALENT AND RED PAVEMENT.



M. MARK SWAAB

MR. SWAAB JOINED THE DEPARTMENT OF TRANSPORTATION IN FEBRUARY 1968. PRIOR TO THIS TIME HE WORKED AS A FIELD SUPERVISOR FOR THIOKOL CHEMICAL CORPORATION SPECIALIZING IN APPLICATIONS OF MATERIALS FOR HIGHWAY CONSTRUCTION AND MAINTENANCE.

MR. SWAAB RECEIVED HIS BACHELOR OF SCIENCE DEGREE IN CHEMICAL ENGINEERING FROM DREXEL INSTITUTE. HE IS CURRENTLY PURSUING A MASTERS DEGREE IN POLYMER ENGINEERING AT NEWARK COLLEGE OF ENGINEERING.

HE IS A MEMBER OF HIGHWAY RESEARCH BOARD COMMITTEE MCD-5 ON ADHESIVES AND BONDING AGENTS IN ADDITION TO MEMBERSHIP IN THE AMERICAN CHEMICAL SOCIETY AND THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS.



FRANK WINTERS

MR. WINTERS JOINED THE DIVISION OF RESEARCH AND EVALUATION IN NOVEMBER 1966 AND IS PRESENTLY SERVING AS A SENIOR ENGINEER WITH THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS.

HIS MAJOR CONTRIBUTION TO DATE HAS BEEN THE DESIGN OF AN EXPERIMENTAL HEATED PAVEMENT SYSTEM. THIS SYSTEM WILL PROVIDE NEW AND VALUABLE INFORMATION ON THE SUBJECT OF SNOW AND ICE CONTROL.

ON MAY 13-17, 1968, MR. WINTERS REPRESENTED HIS BUREAU AT THE AMERICAN SOCIETY OF CIVIL ENGINEERS NATIONAL MEETING ON ENVIROMENTAL ENGINEERING HELD IN CHATTANOOGA, TENNESSEE.

MR. WINTERS DID UNDERGRADUATE WORK AT DREXEL INSTITUTE OF TECHNOLOGY AND RECEIVED HIS B.S. DEGREE IN PHYSICS FROM VILLANOVA UNIVERSITY IN JUNE 1965. HE HAS ALSO TAKEN GRADUATE COURSES AT OREGON UNIVERSITY AND RUTGERS-THE STATE UNIVERSITY.

PUBLICATIONS: "LOUDNESS OF SOUND IN AUTOMOBILES," IN VILLANOVA ENGINEER, MAY 1965.





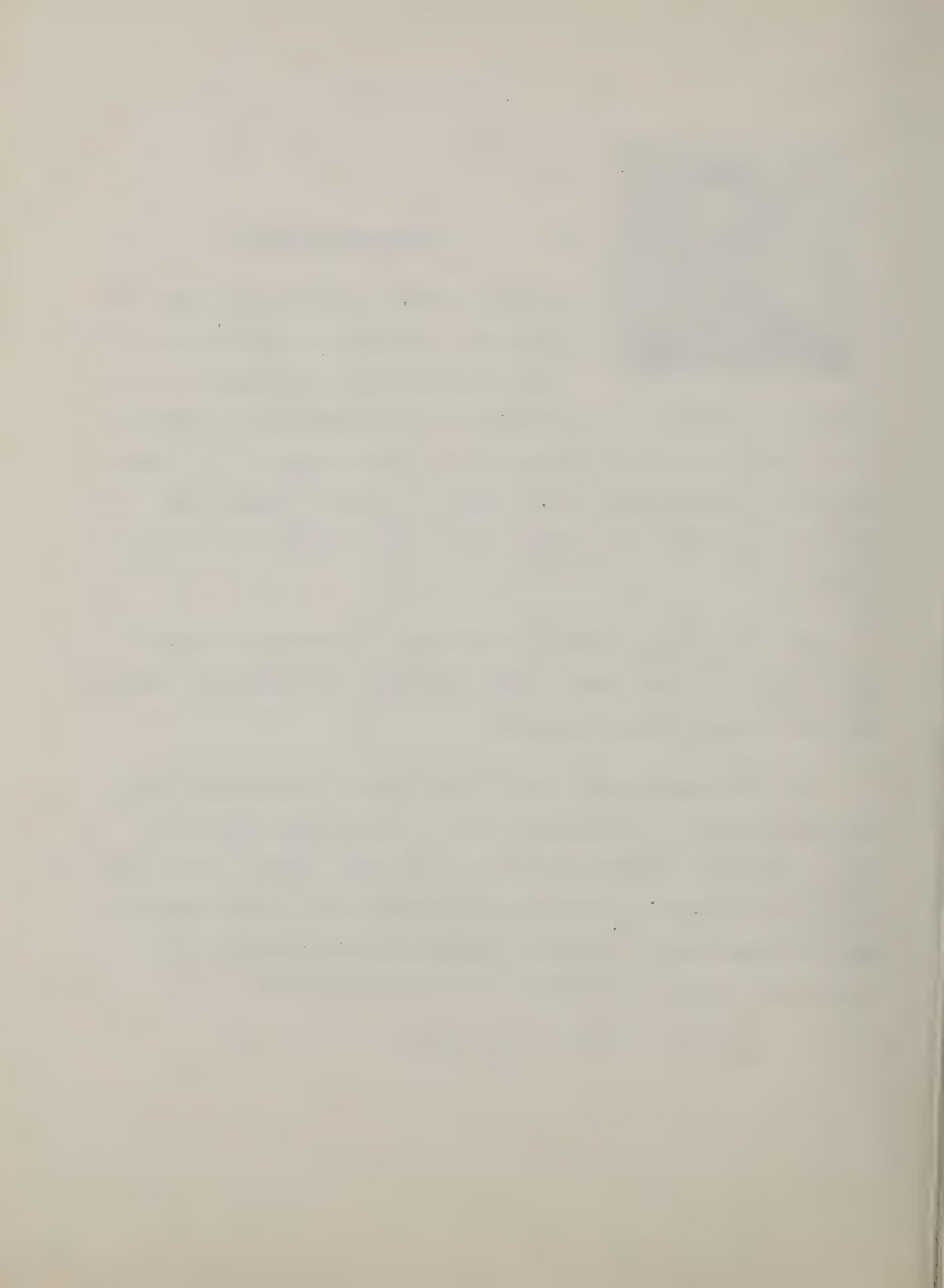
JONAH WITTENBERG

MR. WITTENBERG HAS RECENTLY JOINED THE BUREAU OF ELECTRONICS AND SCIENTIFIC AIDS AFTER AN EXTENSIVE CAREER IN INDUSTRY. HE BRINGS TO THE TRANSPORTATION DEPARTMENT EXPERIENCE IN DESIGN, DEVELOPMENT, MANUFACTURING AND MANAGEMENT OF A BROAD SPECTRUM OF ENGINEERED DEVICES AND ACTIVITIES, RANGING FROM ELECTRICAL SWITCH GEAR AND OPTICAL DEVICES THROUGH MISSILES AND SATELLITES.

HE RECEIVED HIS DEGREE IN MECHANICAL ENGINEERING FROM THE CITY COLLEGE OF NEW YORK IN 1944. HE HAS ALSO COMPLETED NUMEROUS RELATED COURSES SINCE GRADUATION.

MR. WITTENBERG HOLDS TWO PATENTS AND WAS RESPONSIBLE FOR THE DEVELOPMENT OF "A HANDBOOK FOR PRINTED WIRING" PUBLISHED BY THE CHRYSLER CORPORATION MISSILE DIVISION, WHERE IN ADDITION TO HIS ENGINEERING LINE MANAGEMENT RESPONSIBILITIES HE ORGANIZED AND DEVELOPED SPECIAL TRAINING PROGRAMS FOR ENGINEERING AND MANAGEMENT AS WELL AS INSTRUCTING IN THESE PROGRAMS.

HE SERVED IN THE NAVY DURING WORLD WAR II.



**REPORTS BY
DIVISION OF RESEARCH & EVALUATION**

REPORT NUMBERS	TITLES	BUREAUS		
		S.M.	S.T.	E.S.
1.	Composite Pavement Route 3, 1st Interim Report	X		
2.	Report on Pilot Operation of the Fog Screen	X		
3.	Experimental Pavement Project Routes 80 & 95, 1st	X		
4.	Pavement Investigation, Route 295, Section 2F	X		
5.	Experimental Pavement Project Routes 80 & 95, 2nd	X		
6.	Undistributed Sampling of Subbase Materials and Soils	X		
7.	Operational Effects of Overall Geometrics on Safety		X	
8.	Air Pollution Control Interim Report			X
9.	Evaluation of Reflectorized Highway Signs		X	
10.	Reinforced Bituminous Overlays in New Jersey	X		
11.	Low Level Bridge Lighting Installed in New Jersey		X	
12.	Pavement Investigation Route 78, Section 2J	X		
13.	Investigation of Asphalt Paving Problems in N.J.	X		
14.	A Mile Post System for New Jersey		X	
15.	30th Peak Hour Trends, 1964		X	
16.	Relationship of Accident Rates and Involvement		X	
17.	Investigation Route 72 West Approach, Manahawkin	X		
18.	Composite Pavement Route 3, 2nd Interim Report	X		
19.	Signalized Intersection Accident Report, 1964		X	
20.	Summary of Sufficiency Rating Elements		X	
21.	Socio-Economic Impact of Verrazano Narrows Bridge		X	
22.	30th Peak Hour Factor Trends		X	
23.	An Evaluation of New Pedestrian-Actuated Signal		X	
24.	Truck Equivalent		X	
25.	Evaluation of Studded Tires (Report & Paper)	X		
26.	Progress Report on Fog Removal Experiments			X
27.	Lateral Placement and Stopping Distance		X	
28.	A Variance Analysis of Asphaltic Concrete (Report & Paper)	X		
29.	Preformed Elastomeric Expansion Joints (Report & Paper)	X		
30.	Corrosion Tests for Low Alloy Steels (Report & Paper)	X		

	<u>S.M.</u>	<u>S.T.</u>	<u>E.S.</u>
31. Intersection Design		X	
32. Can Traffic Accidents be Reduced Significantly		X	
32A. New Concepts in Highway Design		X	
33. Two-Wire Emergency Call System			X
34. Composite Pavement Route 3, 3rd Interim Report	X		
35. Reflective Pavement Marking, Introductory Report		X	

The method of numbering the research reports has been changed effective July 1, 1967. Henceforth, each report will be numbered using:

Two digits indicating the Fiscal Year

Three digits indicating serially the report within the year

Four digits identifying the research project being reported

An indication of whether the report is an Interim or Final Report will be included on the cover sheet.

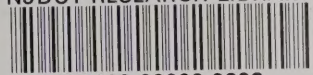
68-001-7702	Experimental Pavement Project (Route I-80 Section 5V and Route I-95 Section 1R) 3rd Interim Report	X		
68-002-7706	Intersection Design—Fall 1967		X	
68-003-7760	Dolomite Study—Relative Skid Resistance of Bituminous Concrete Pavement Surfaces Containing Dolomite Course Aggregates	X		
68-004-7754	Rumble Strips	X		
68-005-7702	Experimental Pavement Project (Route I-80 Section 5V and Route I-95 Section 1R) 4th Interim Report	X		
68-006-7705	Capacity of Design Features, Detour Route Around Route 21 Viaduct-Newark		X	
68-007-7767	Fog Abatement Progress Report			X
68-008-7785	Evaluation of Metallic Bridge Decks	X		
68-009-7704	Truck Equivalency		X	
68-010-7771	Colored Pavement		X	
68-011-7789	Yield Sign Study		X	
68-012-7716	Two Wire Emergency Call System, Interim Report No. 2			X
68-013-7784	Portland Cement Concrete Pavement Damage Due to Joint Intrusion and Thermal Expansion	X		
68-014-7734	Fourth Interim Report, Route 3	X		
68-015-7772	Skid Resistance-Supplementary Guidelines	X		
68-016-7707	Traffic Flow Through Traffic Signals		X	

68-017-7788	Chain Link Fence Evaluation
68-018-7781 (7711)	Statistical Correlation & Variance Analysis; Part I: Structural Concrete
68-019-7769	Milepost Inventory
68-020-7703	Relationship of Accident Rates with Hourly Traffic Volumes
68-021-7734	Experimental Composite Pavement, Route 3 (Paper)
68-022-7702	Experimental Pavement Project Routes 80 & 95 (Presentation)
68-023-7781	Statistical Study of Asphaltic Concrete (Presentation)
68-024-7704	Truck Equivalency on a Multilane Roadway

<u>S.M.</u>	<u>S.T.</u>	<u>E.S.</u>
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WHAT YOU DON'T KNOW ABOUT US WOULD FILL A POSTER

N E W J E R S E Y

IS THE MOST DENSELY POPULATED STATE IN THE COUNTRY.

IT HAS . . . THE MOST DENSELY POPULATED MUNICIPALITY IN THE COUNTRY
. . . THE MOST TRAFFIC PER MILE OF ROAD
. . . THE HIGHEST MOTOR VEHICLE REGISTRATION PER AREA
. . . THE LARGEST ROAD MILEAGE PER AREA.

IT ALSO HAS . . . THE SMALLEST TOTAL ROAD MILEAGE PER PERSON
. . . THE SMALLEST AMOUNT OF FEDERAL FUNDS PER PERSON.

IT IS LOGICAL, THEREFORE, TO EXPECT MANY PROBLEMS TO APPEAR
IN N E W J E R S E Y FIRST - IN THEIR MOST ACUTE FORM.

THIS MAKES RESEARCH A NECESSITY

